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Tsukamoto

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(54) **BELT DEVIATION CORRECTION DEVICE FIXING DEVICE, IMAGE FORMING APPARATUS, AND BELT DEVIATION CORRECTION METHOD**

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G03G 15/20 (2006.01)
G03G 15/00 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 15/50*** (2013.01); ***G03G 15/2064*** (2013.01); ***G03G 15/55*** (2013.01); *G03G 2215/00156* (2013.01); *G03G 2215/2019* (2013.01); *G03G 2215/2025* (2013.01); *G03G 2215/2032* (2013.01)

(58) **Field of Classification Search**
CPC G03G 15/204; G03G 15/501; G03G 15/55; G03G 2215/2019; G03G 2215/2025; G03G 2215/2032; G03G 2215/2035; G03G 2215/2038; G03G 2215/2041; G03G 15/2064
See application file for complete search history.

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(57) **ABSTRACT**

A belt deviation correction device for correcting a deviation of an endless belt wound around a plurality of rollers includes a pressing roller that is pressed from outside the endless belt wound around the plurality of rollers. The pressing roller is configured to swing in such a way as to be inclined with respect to the plurality of rollers. A deviation of the endless belt in a direction of an axis of rotation of the plurality of rollers is corrected by swinging the pressing roller.

17 Claims, 17 Drawing Sheets

(PRESSURE RELEASE STATE)

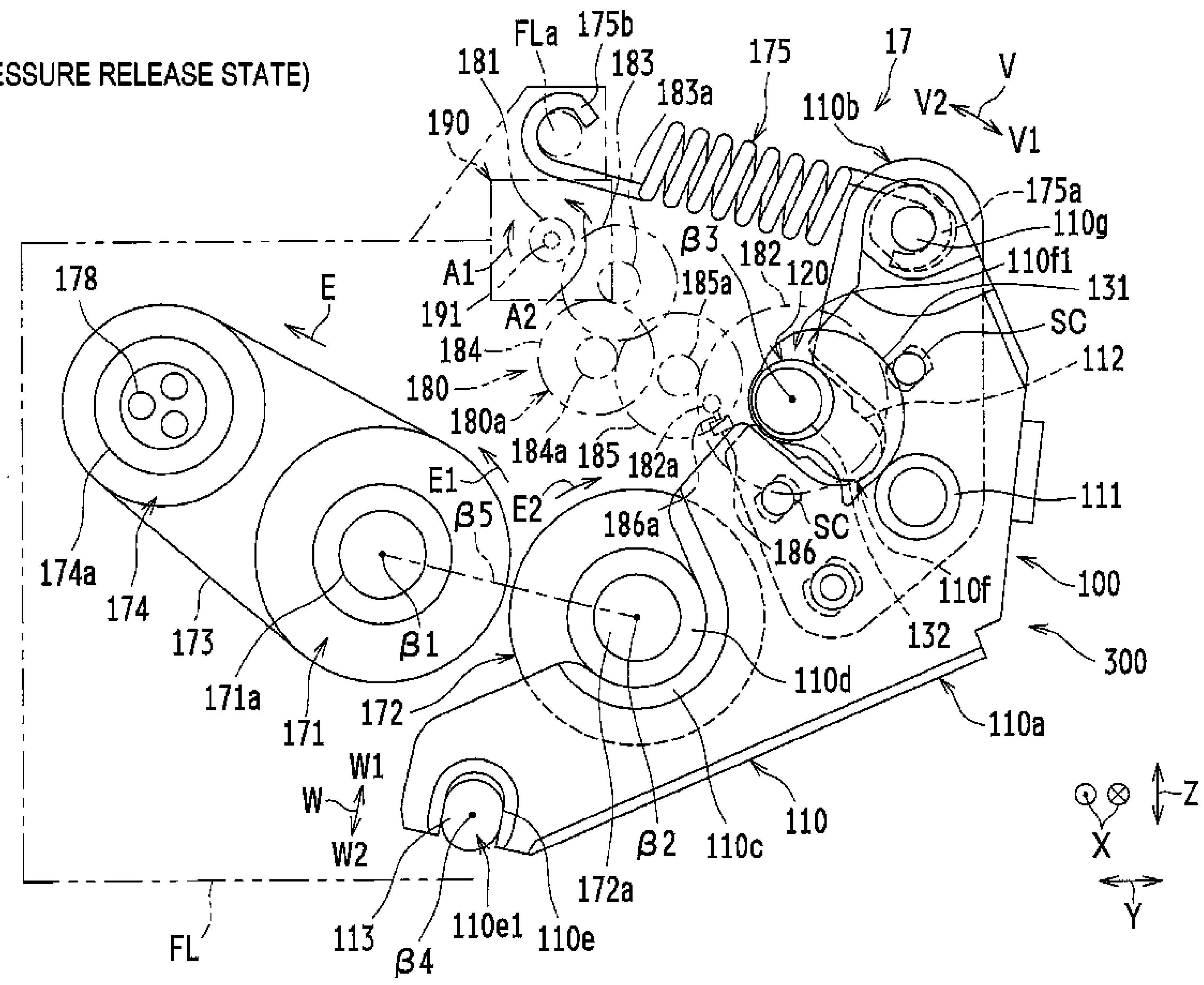


FIG. 1

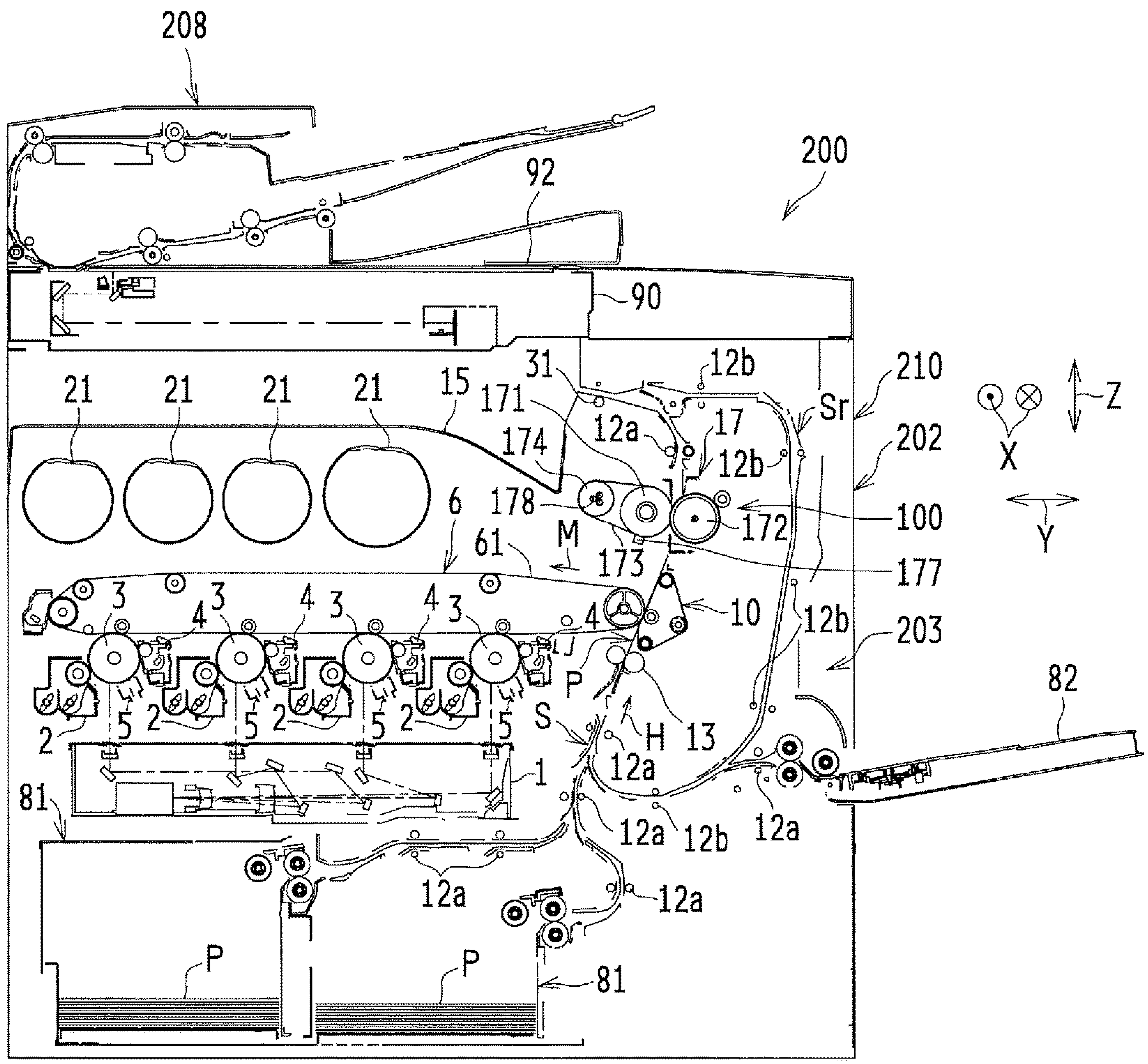

208
200
92
90
31
12b
210
Sr
202
Z
X
Y
21
21
21
21
15
171
12a
17
174
12b
178
172
100
173
177
6
61
M
10
12b
203
3
4
3
4
3
4
3
4
P
13
H
S
82
2
5
2
5
2
5
2
5
12a
1
81
12a
12b
12a
12a
12a
P
P
81

FIG. 2

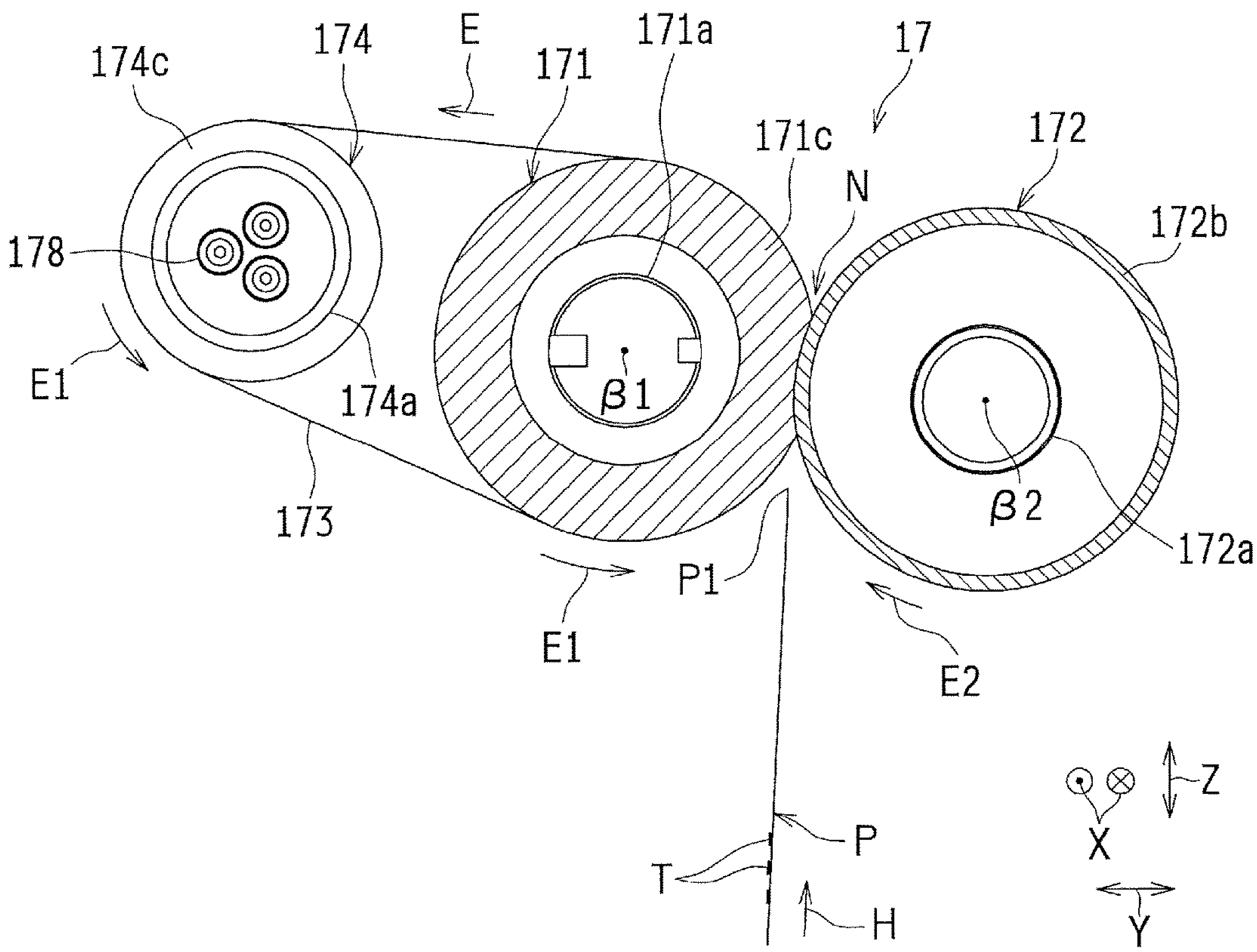

174c
174
E
171
171a
17
171c
N
172
172b
178
E1
174a
β1
β2
173
172a
P1
E1
E2
Z
X
P
T
H
Y

FIG. 3

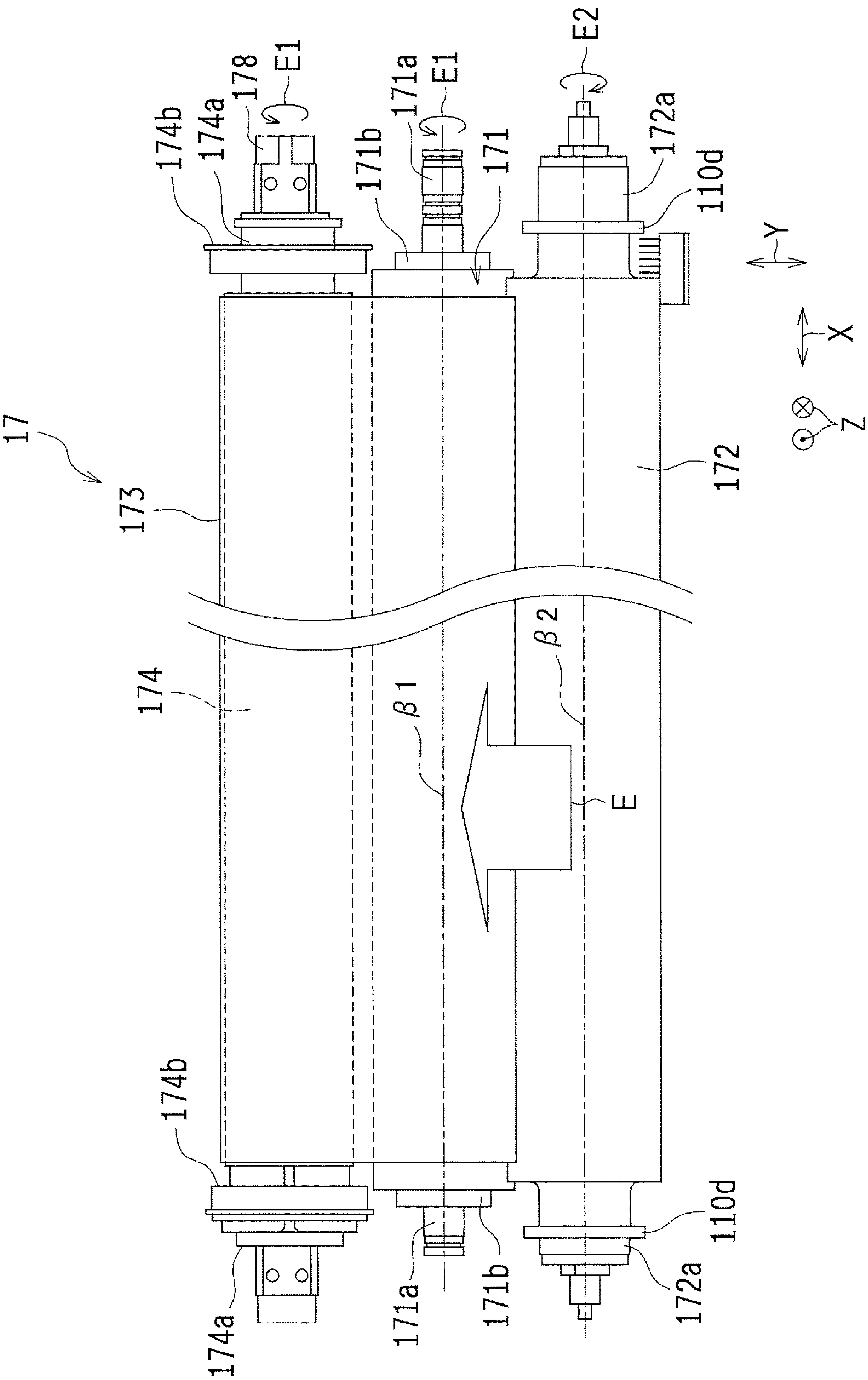

17
173
174
174b
174a
178
E1
171a
171b
171
E2
172a
110d
Y
X
Z
172
β1
β2
E

FIG. 4
(PRESSURE RELEASE STATE)

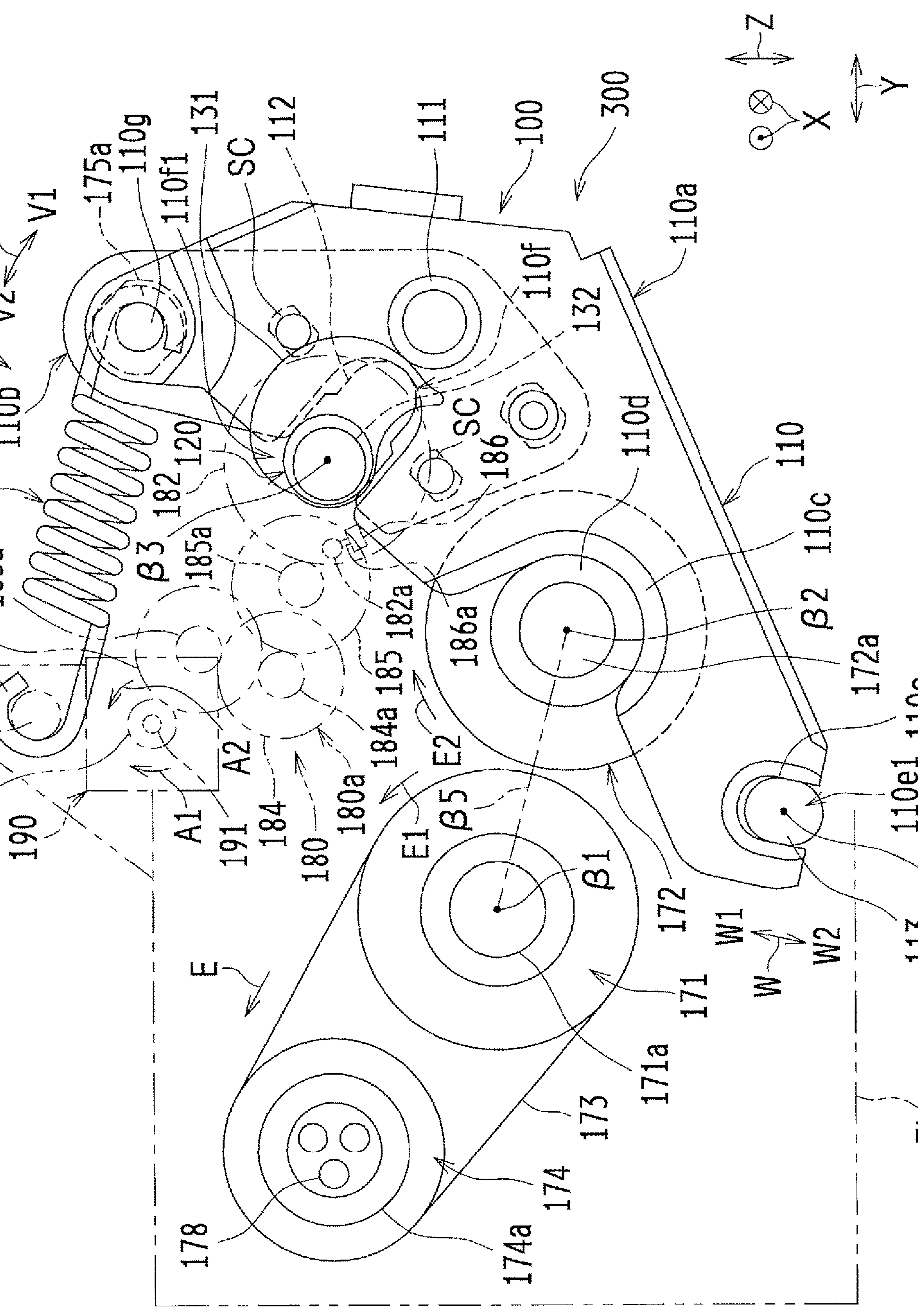


FIG. 5
(PRESSURE RELEASE STATE)

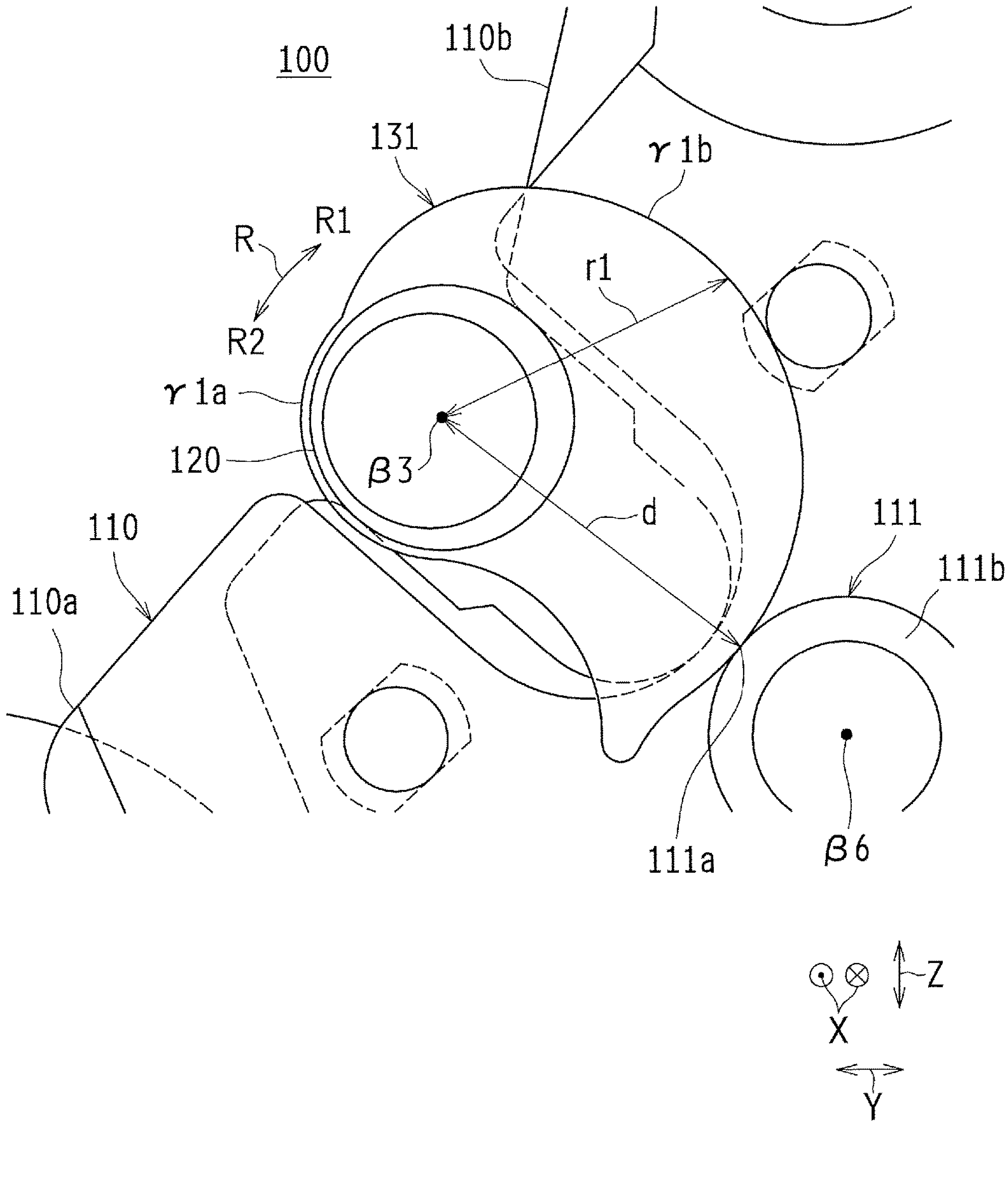


FIG. 6
(PRESSURE RELEASE STATE)

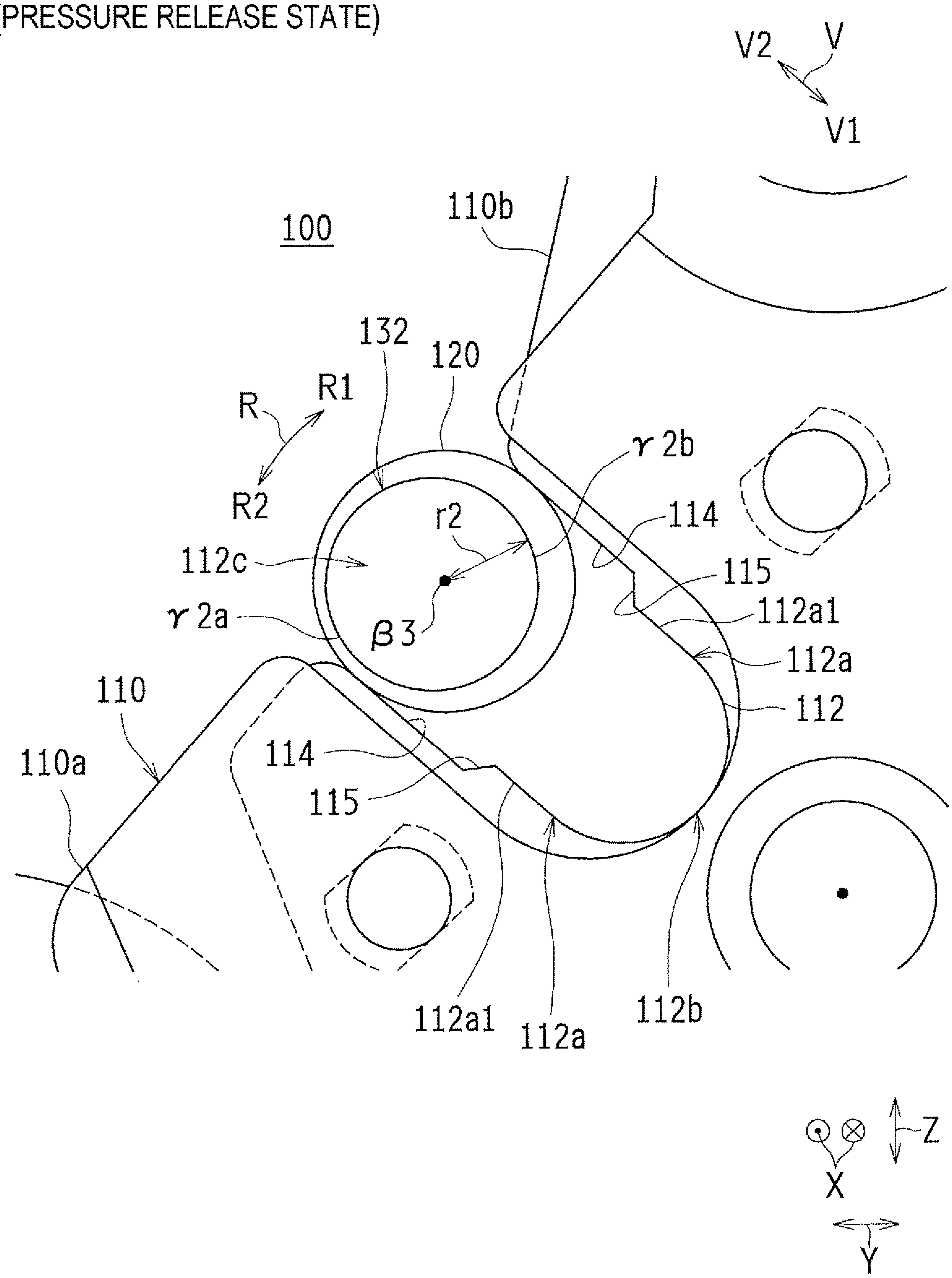


FIG. 7

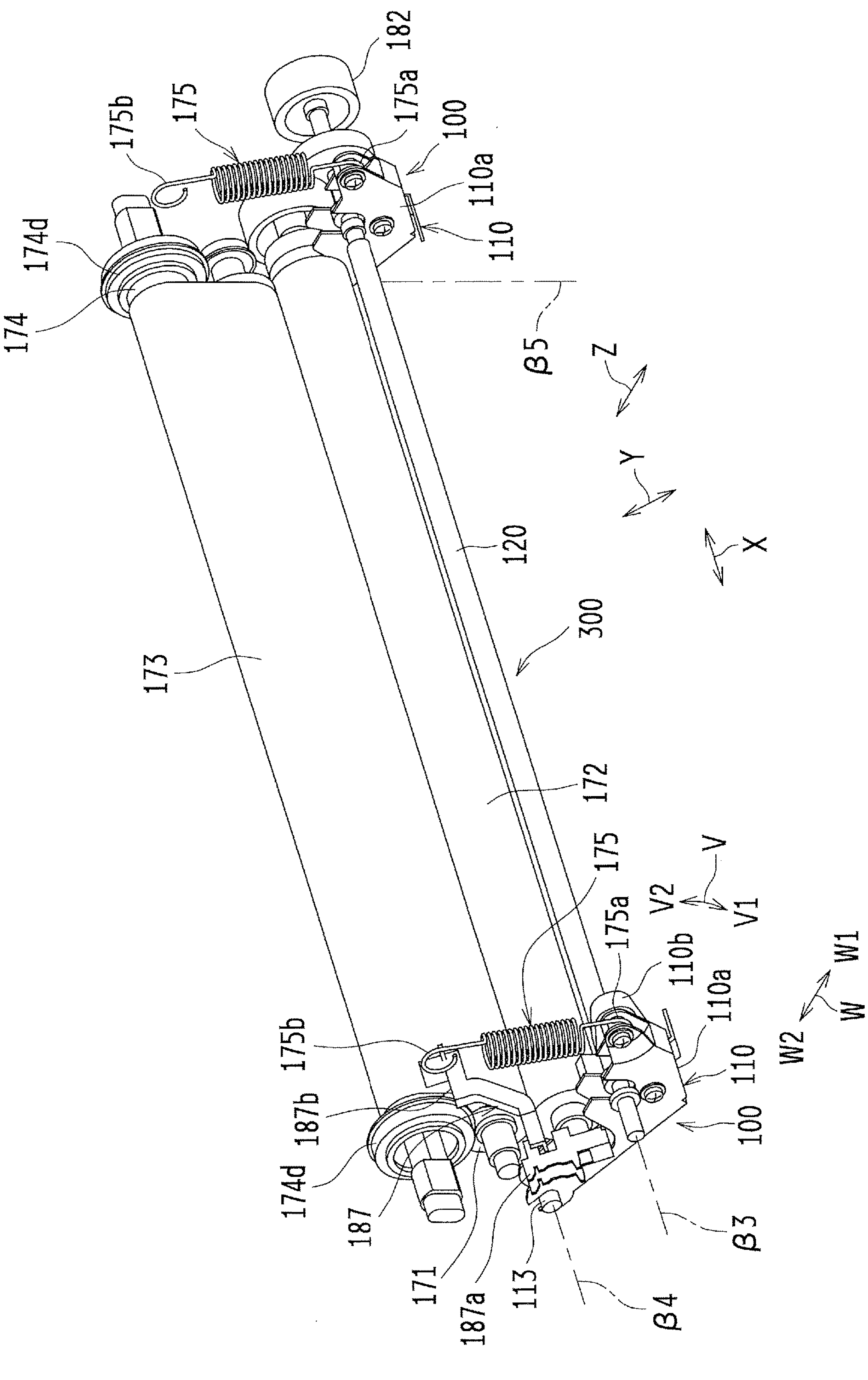
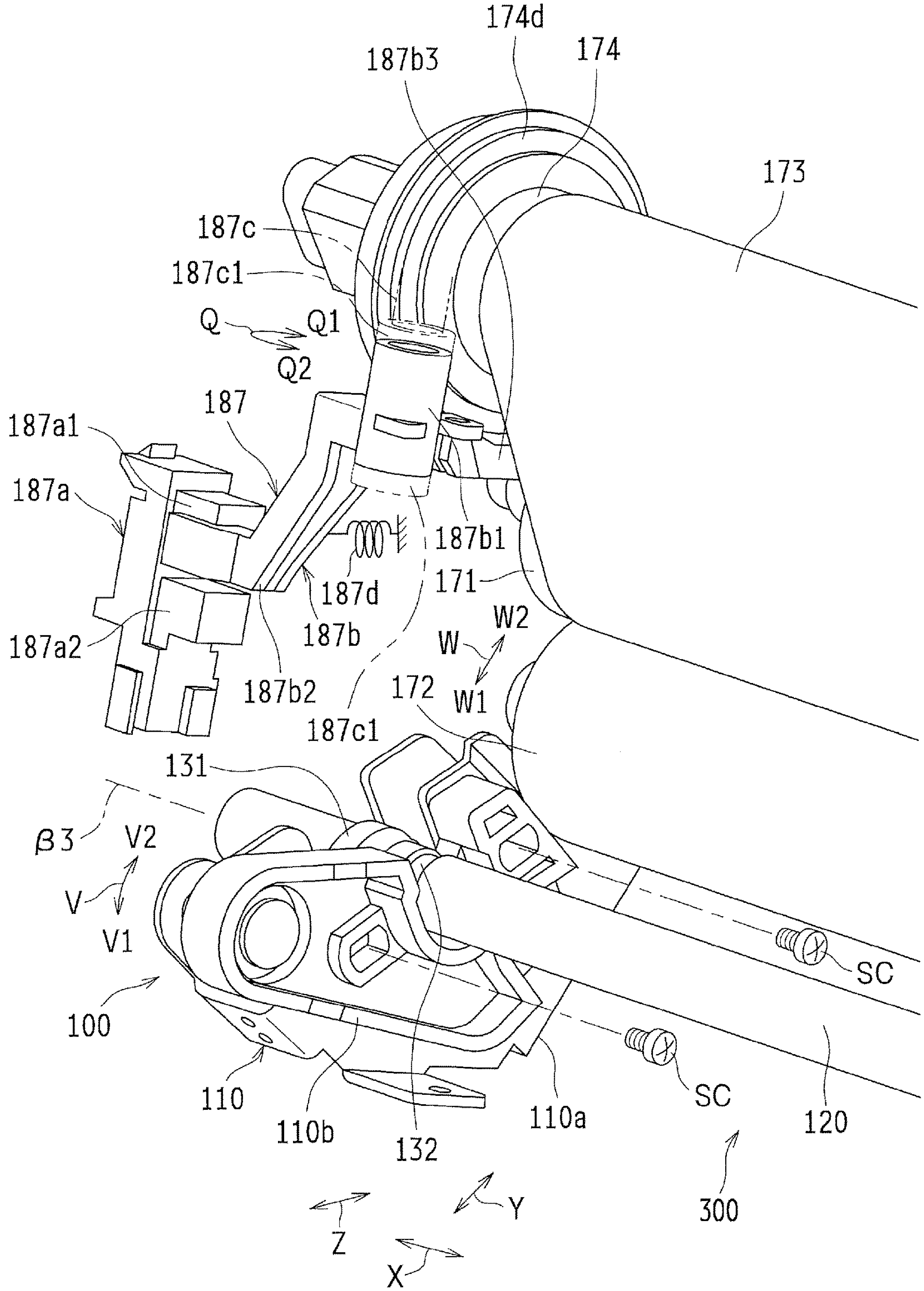

182
175a
100
110a
110
175b
175
174d
174
β5
Z
Y
X
120
300
173
172
175
V
V2
V1
175a
110b
110a
W1
W
W2
110
100
175b
187b
174d
187
171
187a
113
β3
β4

FIG. 8


174d
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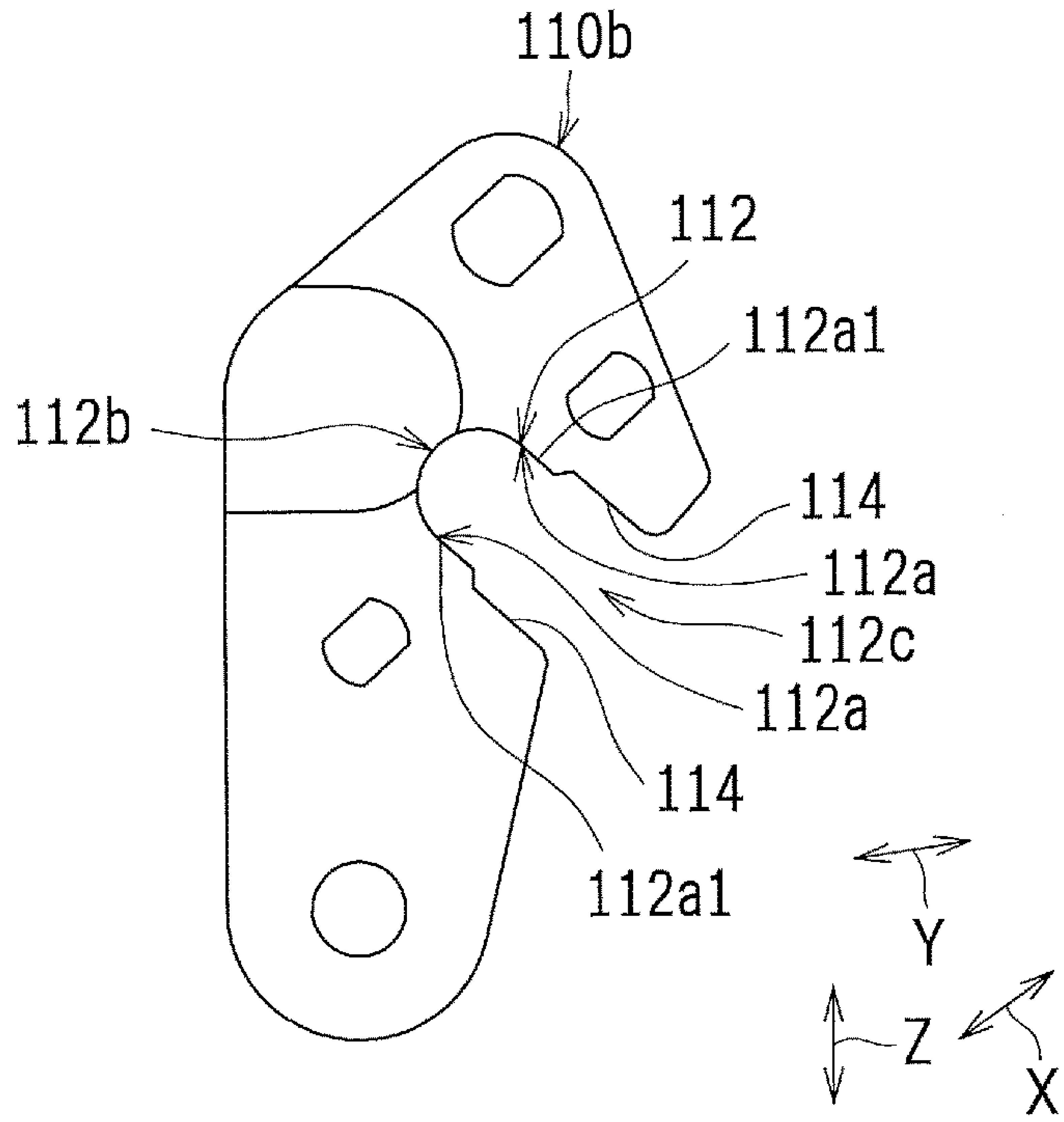
173
187c
187c1
Q
Q1
Q2
187
187a1
187a
187b1
171
187d
187b
187a2
W
W2
W1
187b2
172
187c1
131
β3
V2
V
V1
SC
100
SC
110
110b
132
110a
120
300
Y
Z
X

FIG. 9A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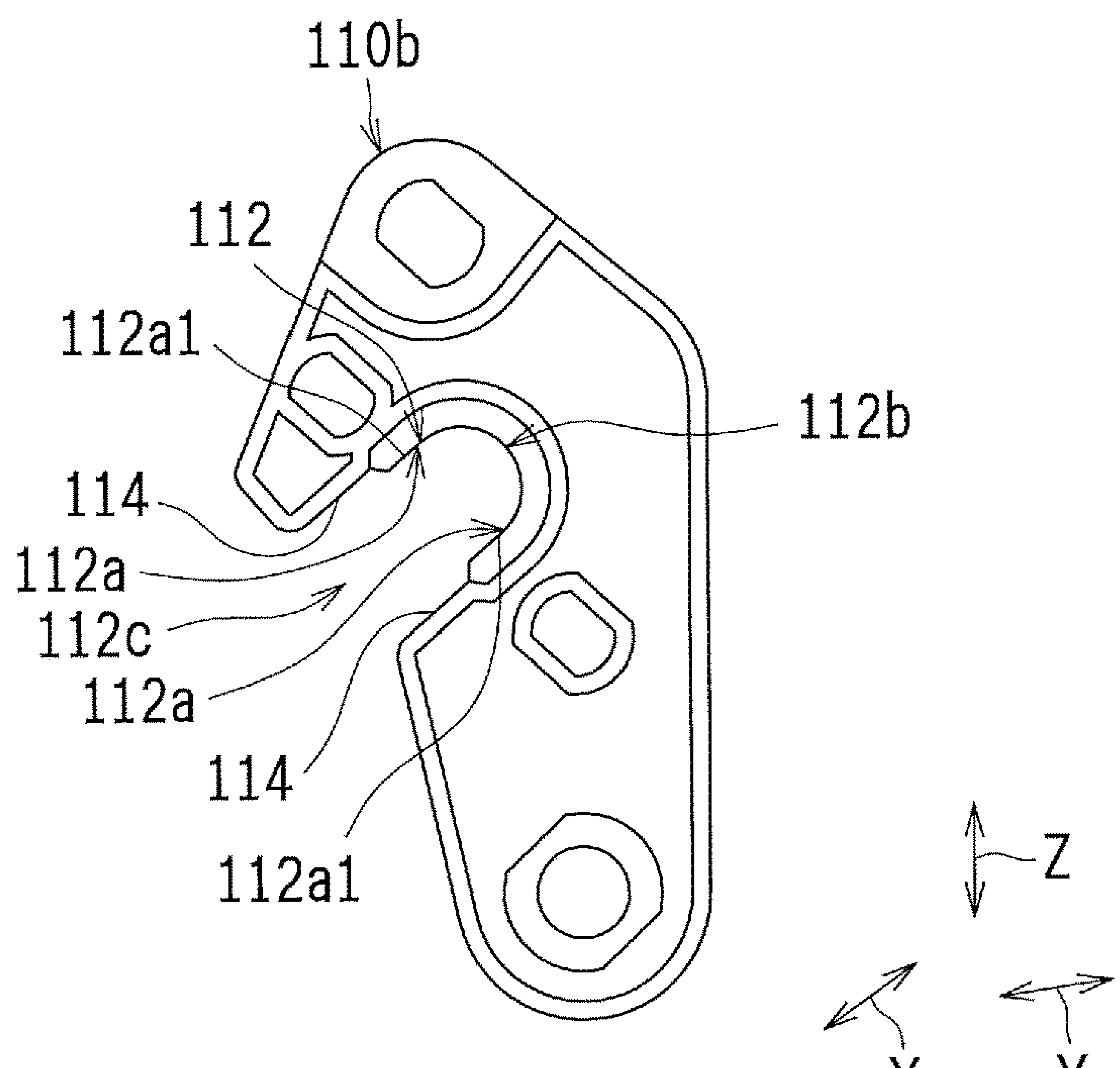
112a
112c
112a
114
112a1
Y
Z
X

FIG. 9B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112a
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112a
114
112a1
Z
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Y

FIG. 10

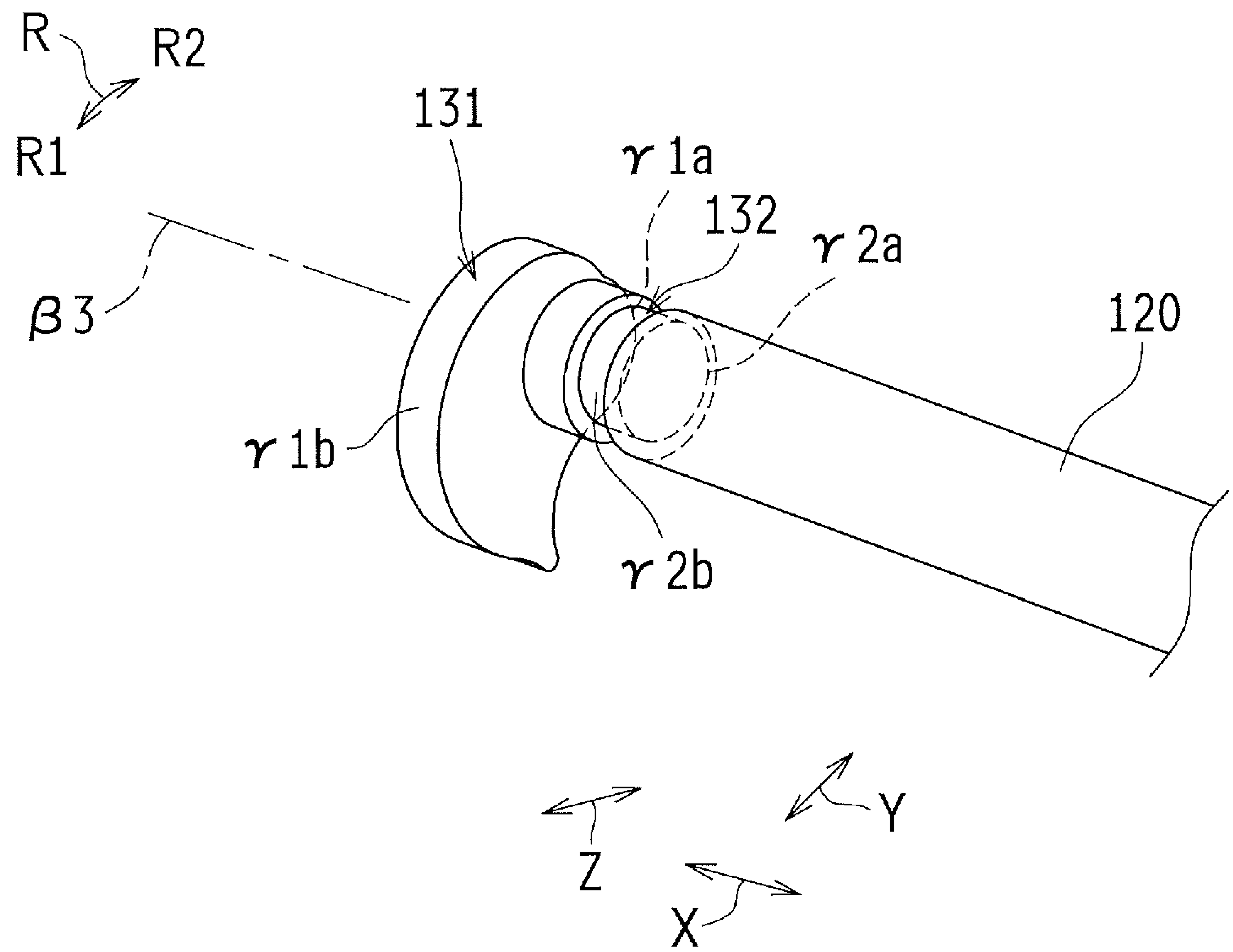


FIG. 11A

(DURING PRESS ACTION:
PRESSED STATE)

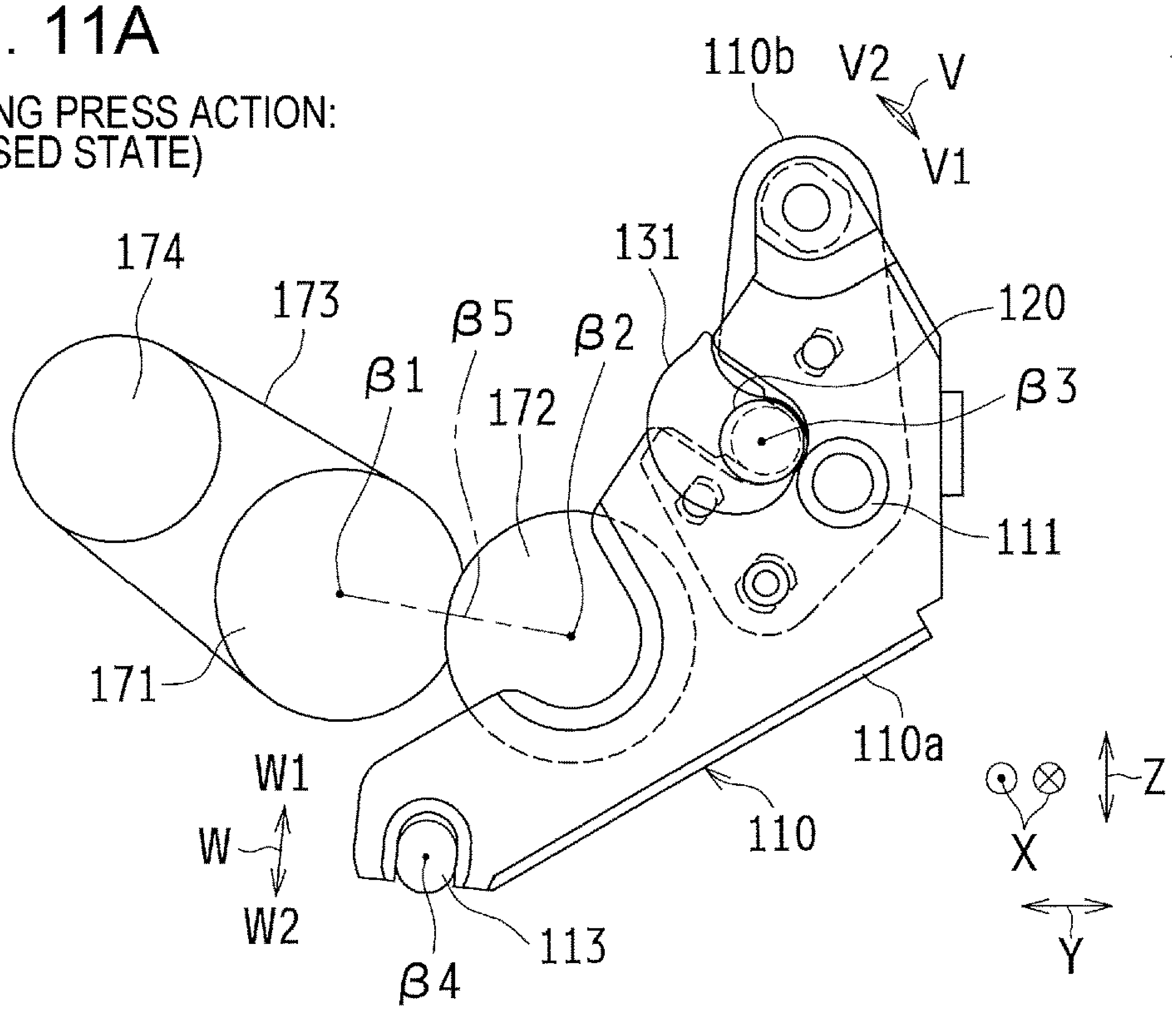


FIG. 11B

(DURING DEVIATION CORRECTION ACTION:
INCLINED STATE OF PRESSURE
ROLLER IN FIRST DIRECTION)

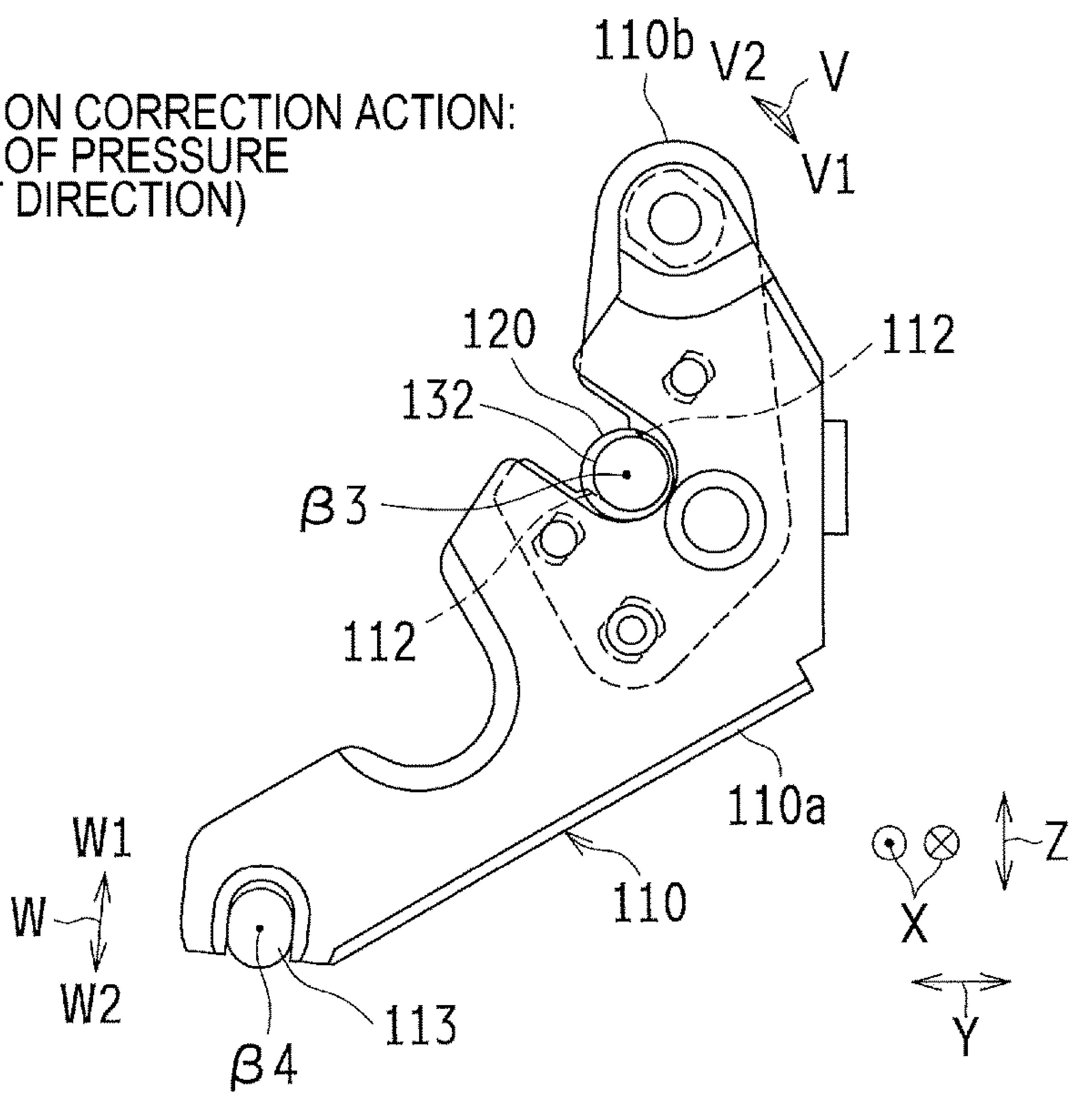


FIG. 12A
(DURING PRESS ACTION: PRESSED STATE)

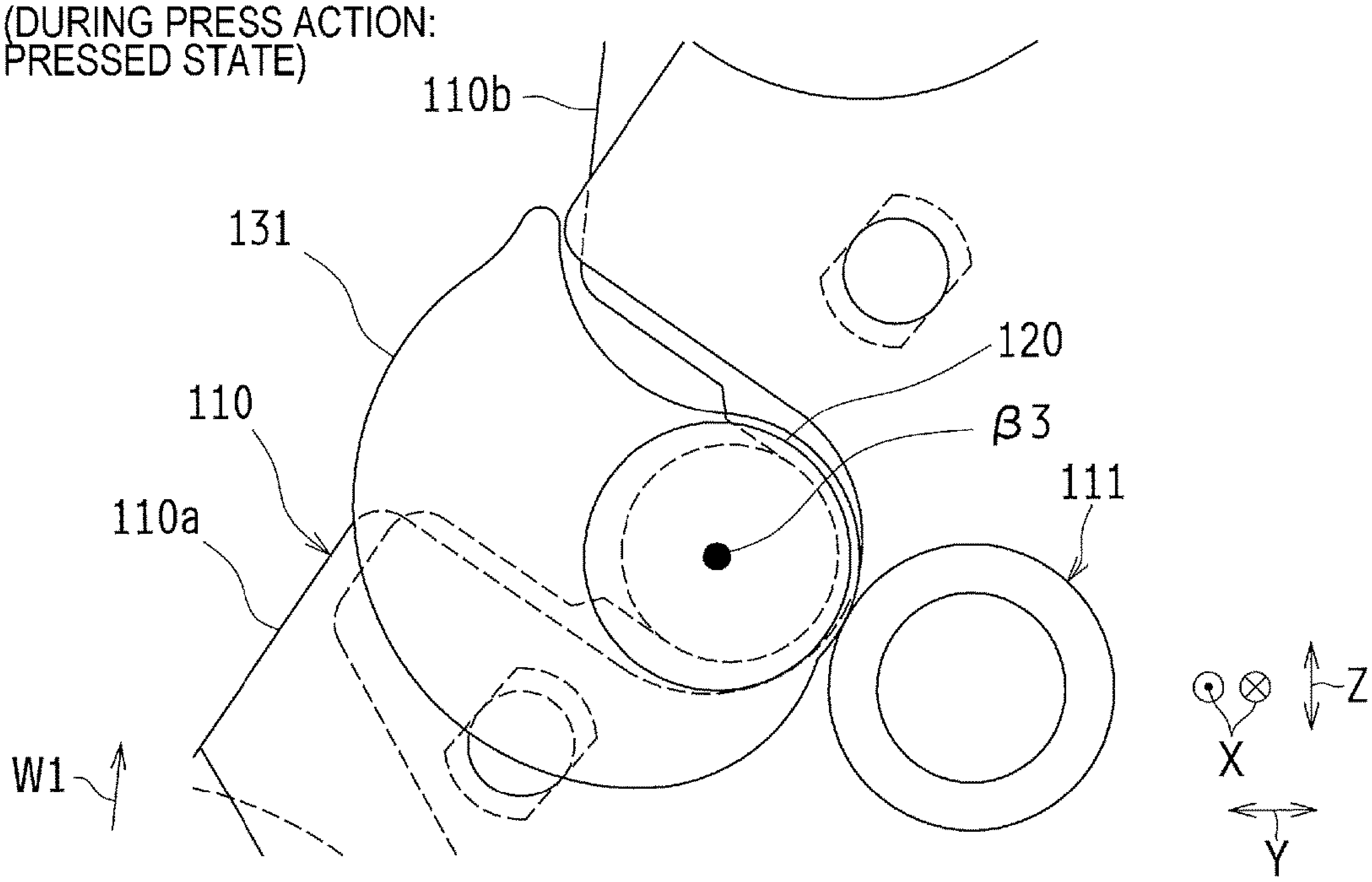


FIG. 12B
(DURING DEVIATION CORRECTION ACTION: INCLINED STATE OF PRESSURE ROLLER IN FIRST DIRECTION)

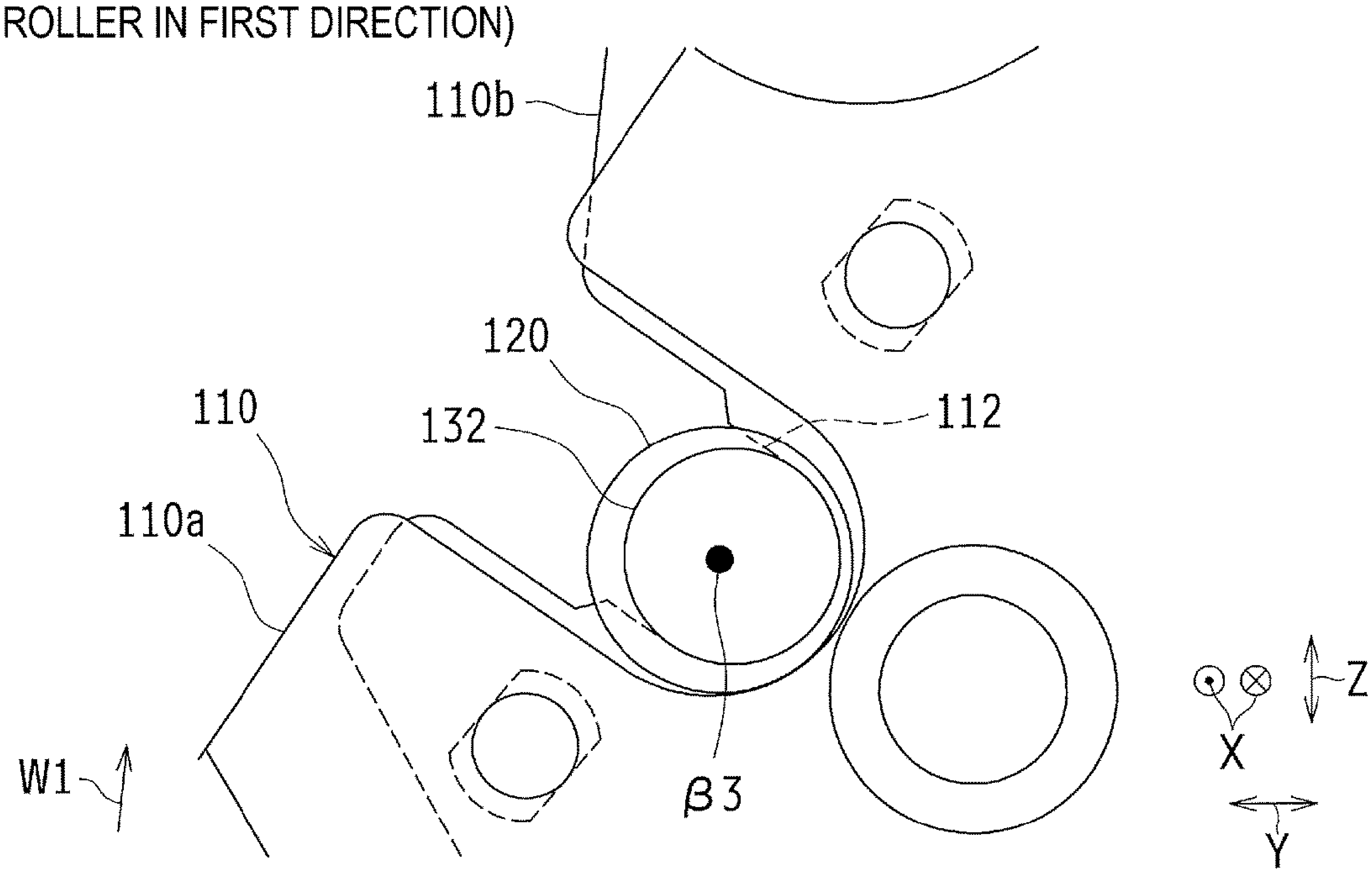


FIG. 13A
(DURING PRESS ACTION: PRESSED STATE)

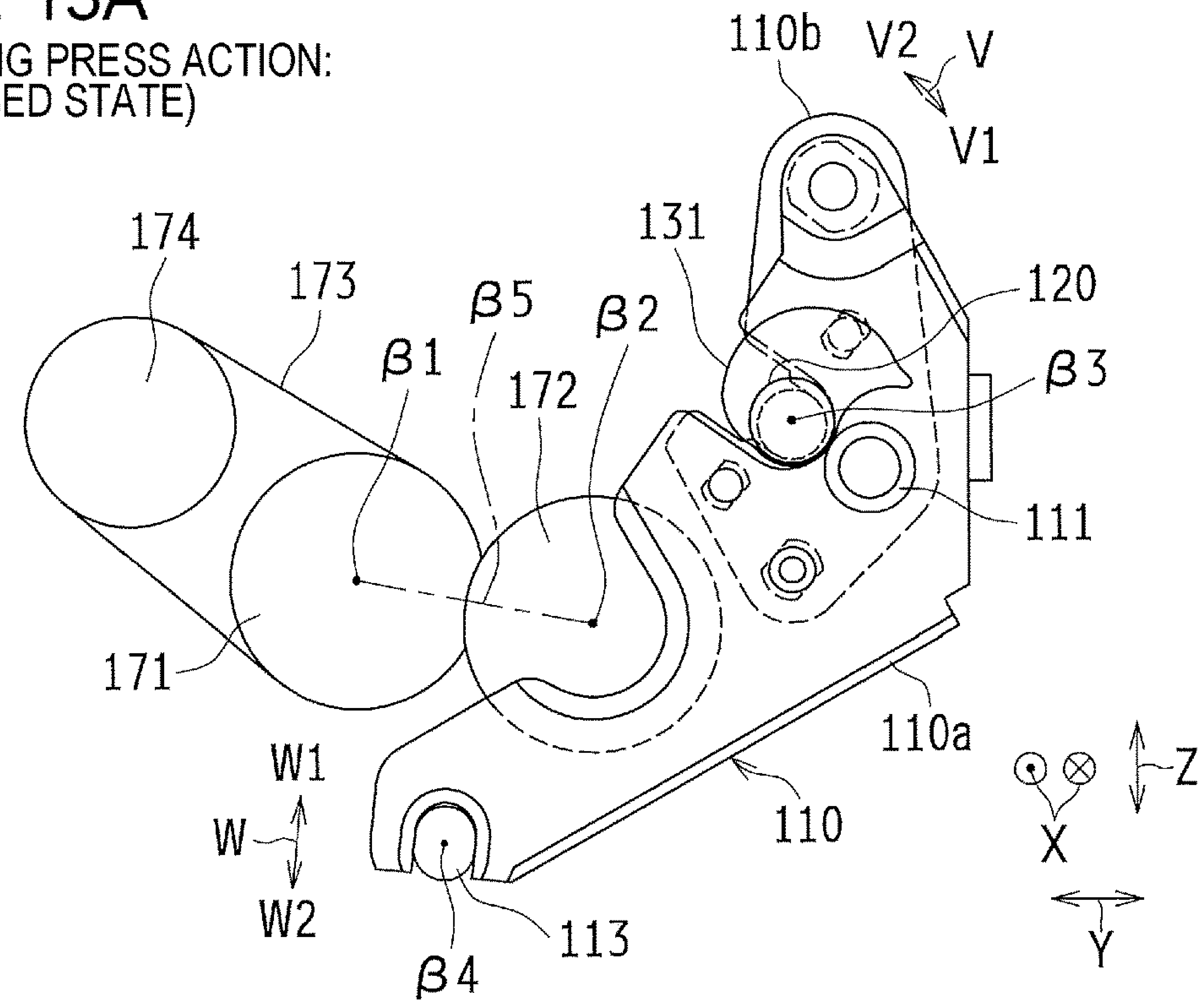


FIG. 13B
(DURING DEVIATION CORRECTION ACTION: INCLINED STATE OF PRESSURE ROLLER IN SECOND DIRECTION)

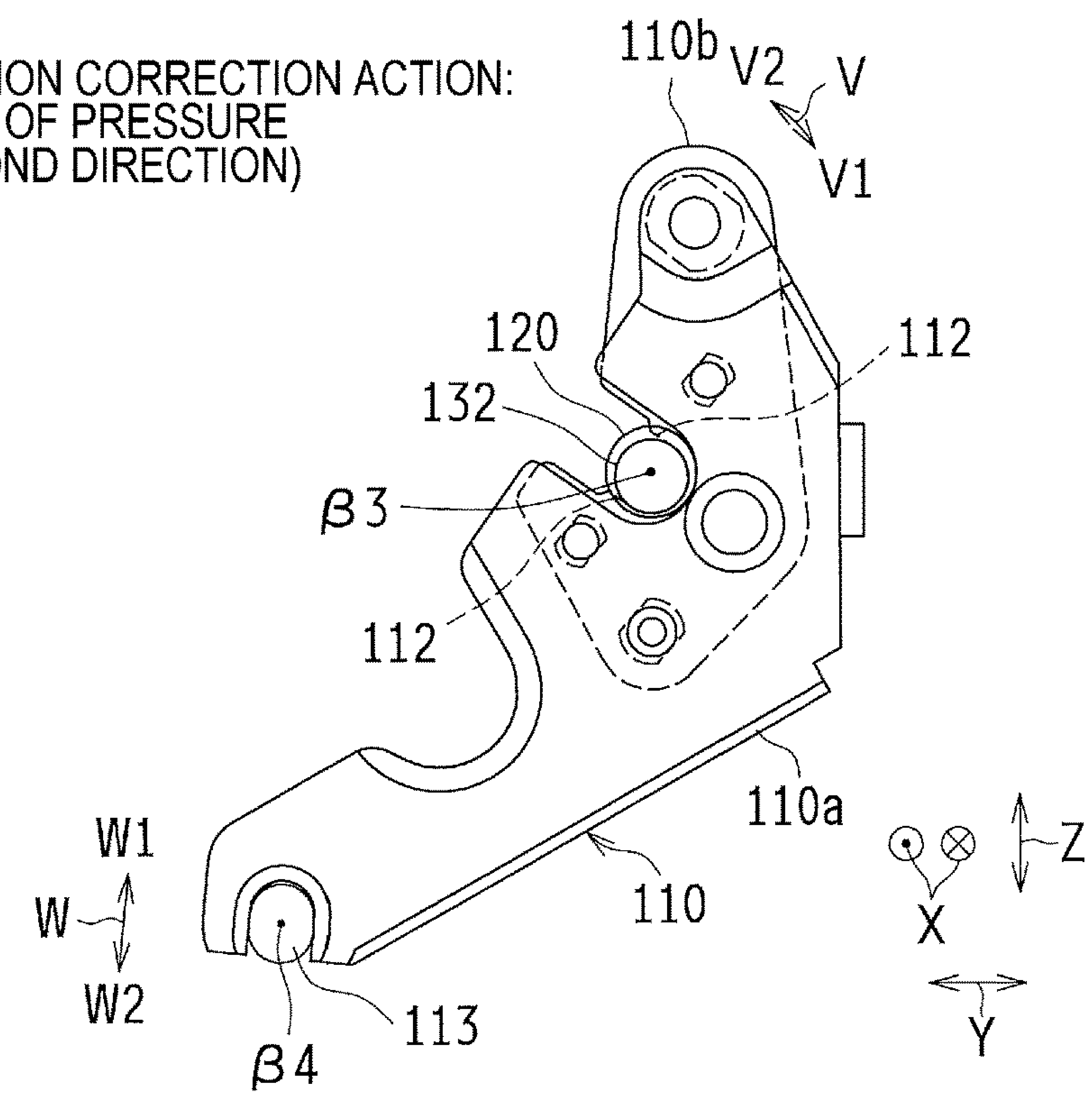


FIG. 14A
(DURING PRESS ACTION: PRESSED STATE)

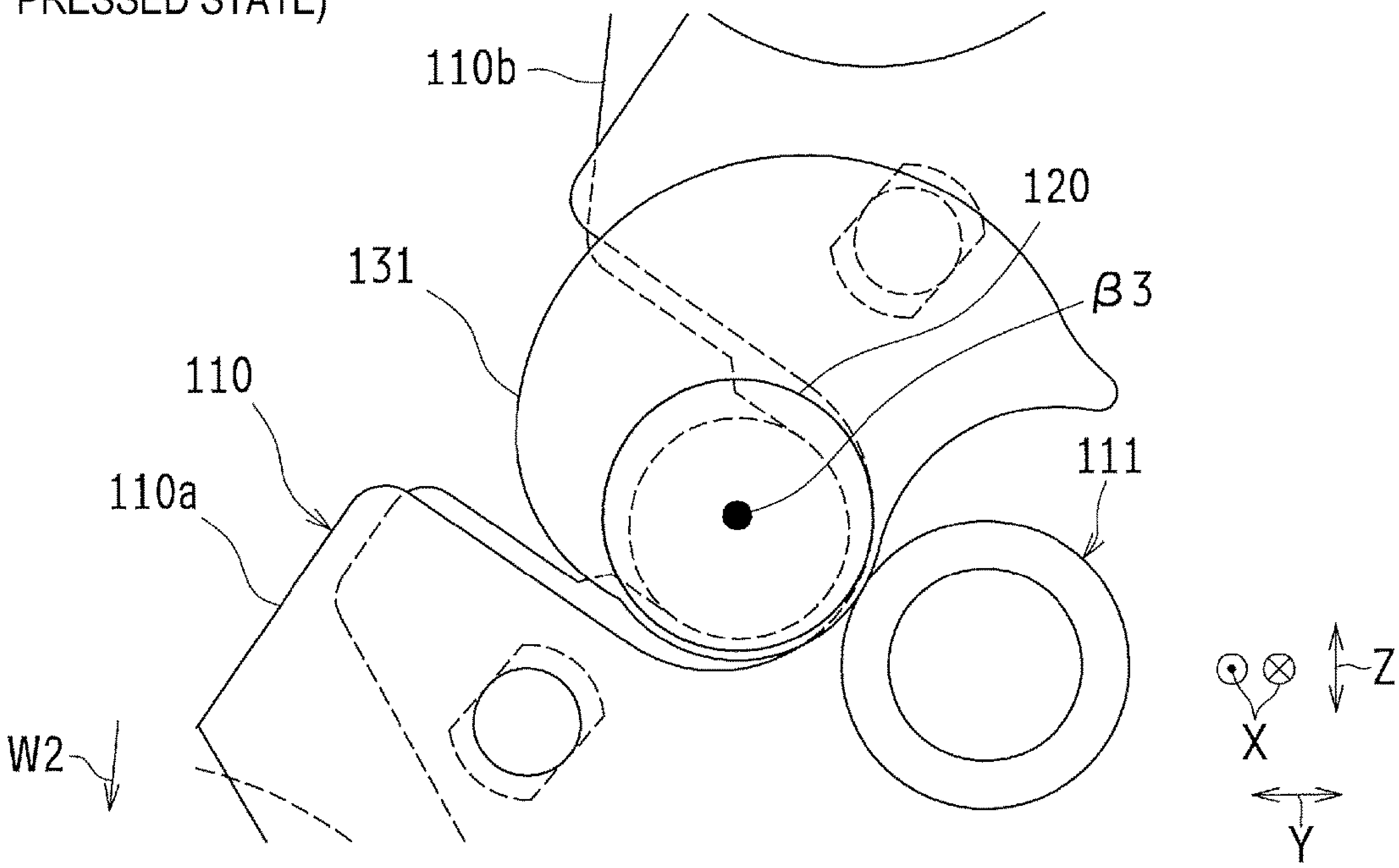


FIG. 14B
(DURING DEVIATION CORRECTION ACTION: INCLINED STATE OF PRESSURE ROLLER IN SECOND DIRECTION)

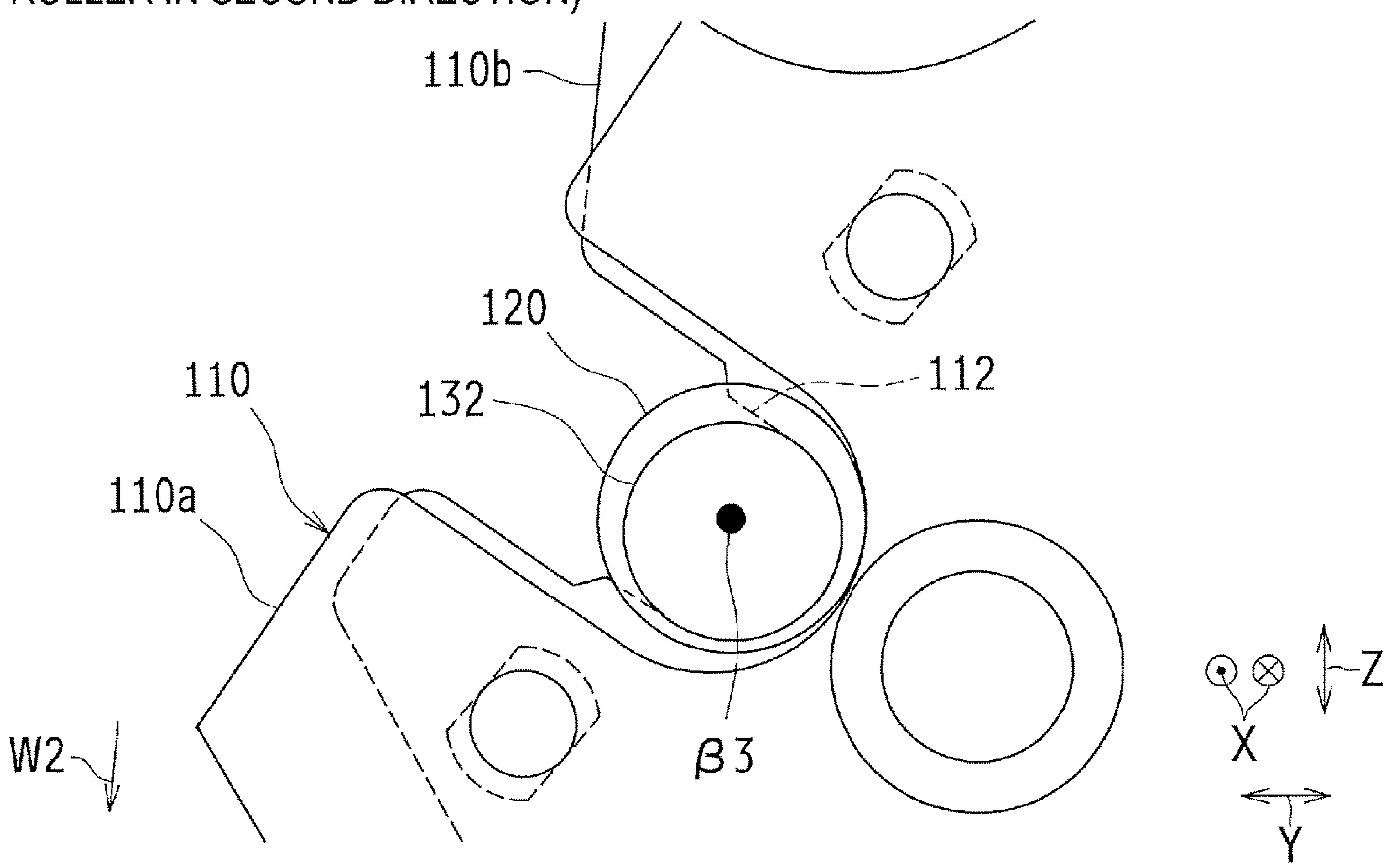


FIG. 15A

(DURING PRESS ACTION: PRESSED STATE)

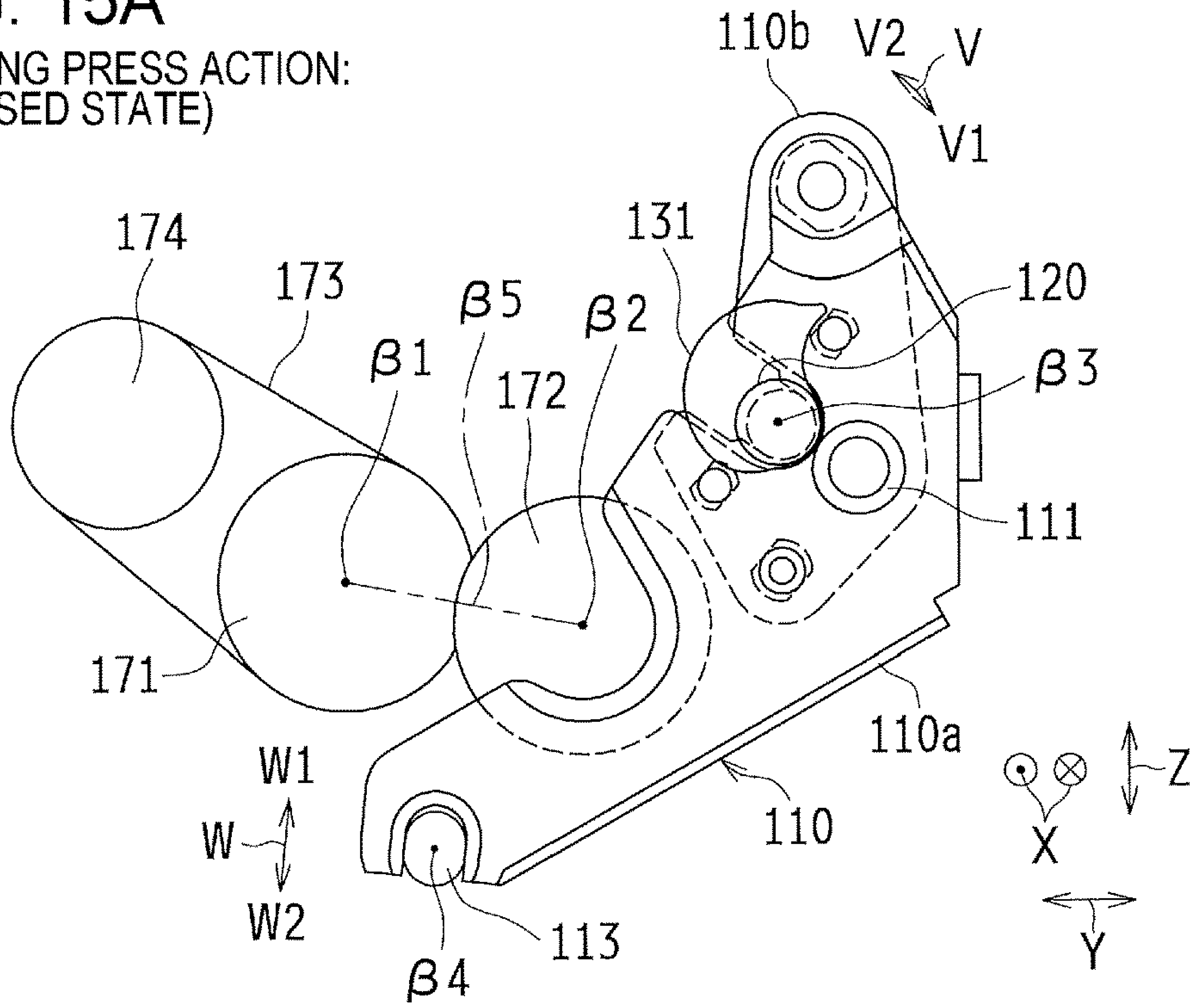


FIG. 15B

(DURING DEVIATION CORRECTION ACTION: PRESSURE ROLLER IN PARALLEL STATE)

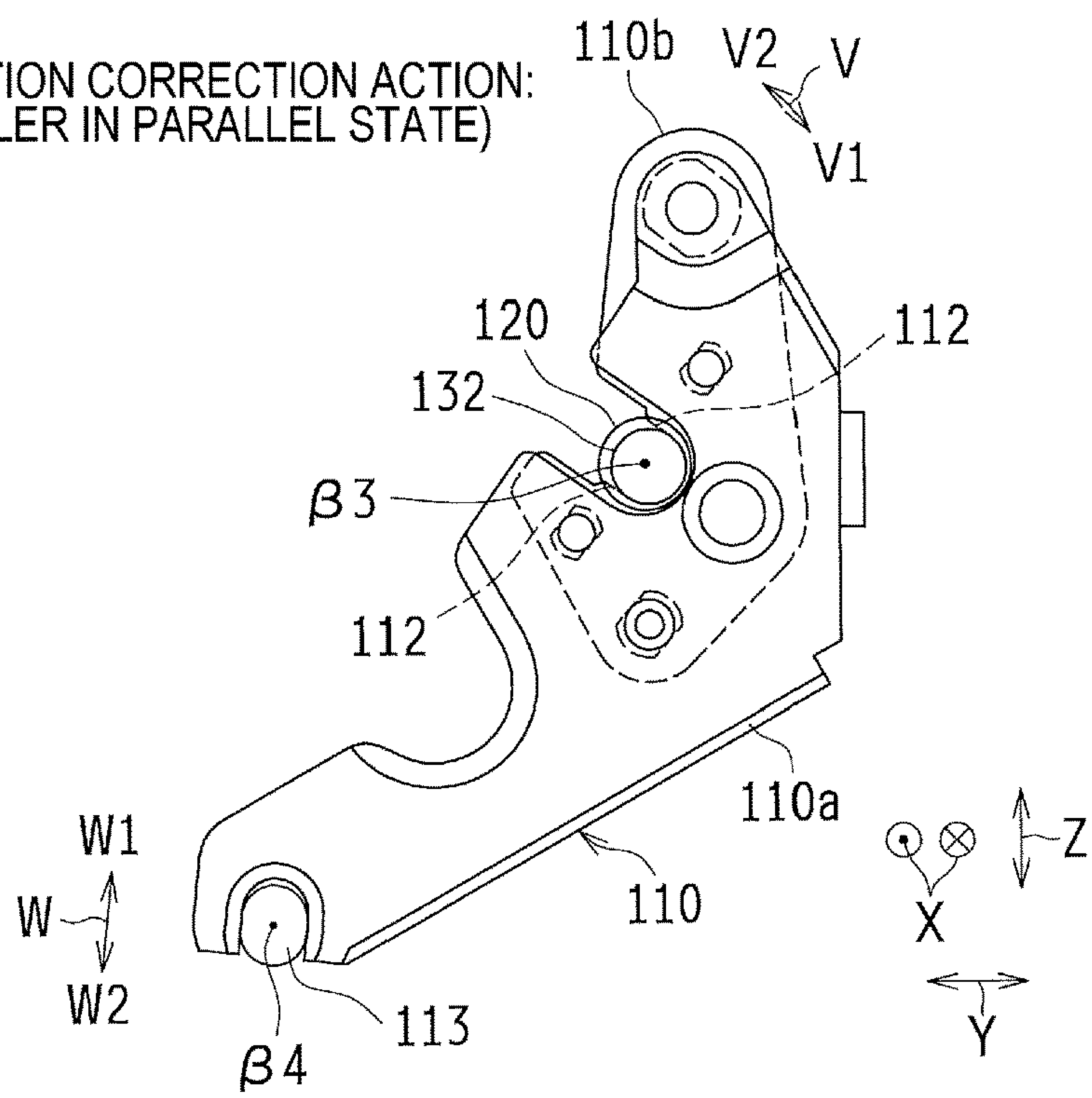


FIG. 16A

(DURING PRESS ACTION:
PRESSED STATE)

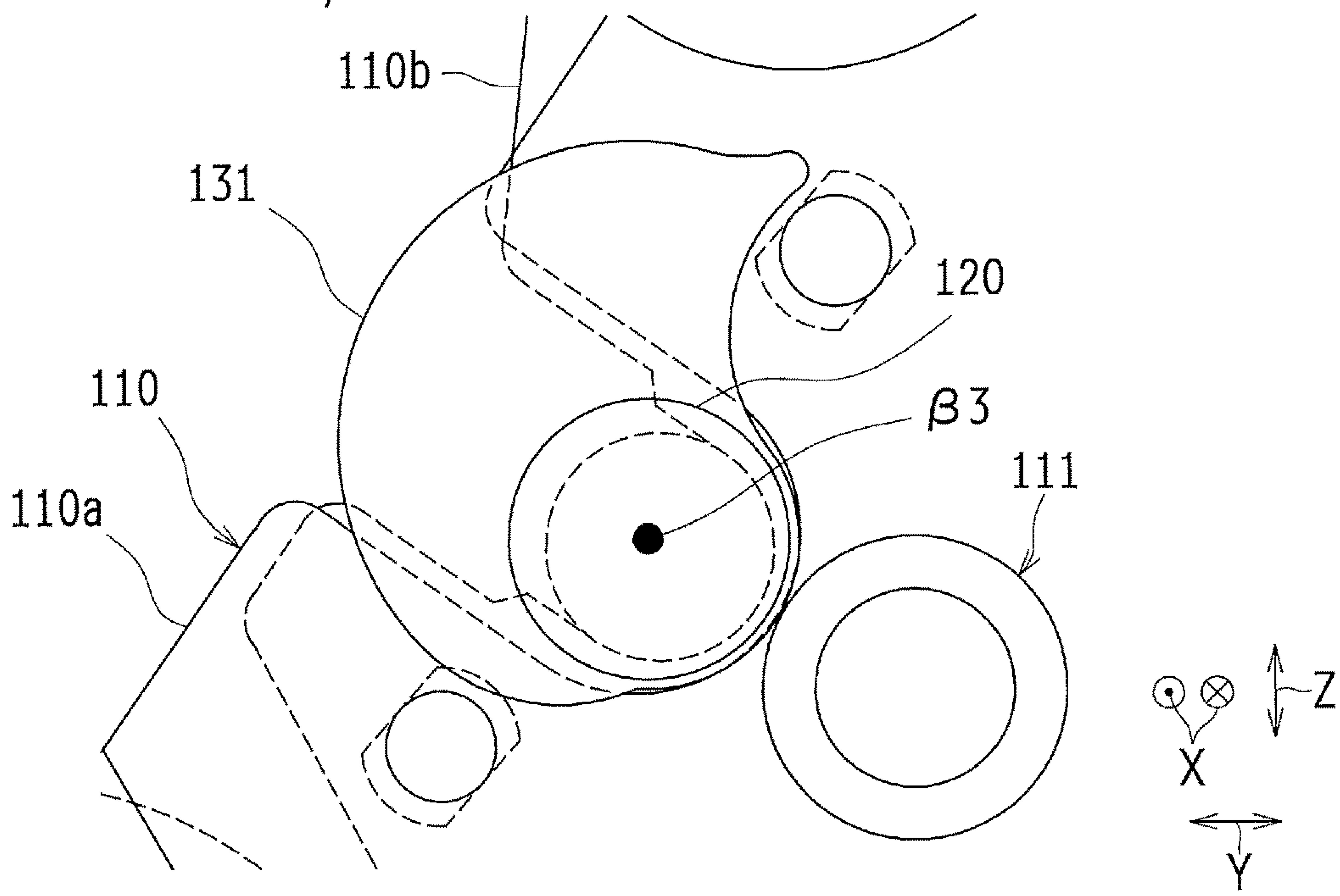


FIG. 16B

(DURING DEVIATION CORRECTION ACTION:
PRESSURE ROLLER IN PARALLEL STATE)

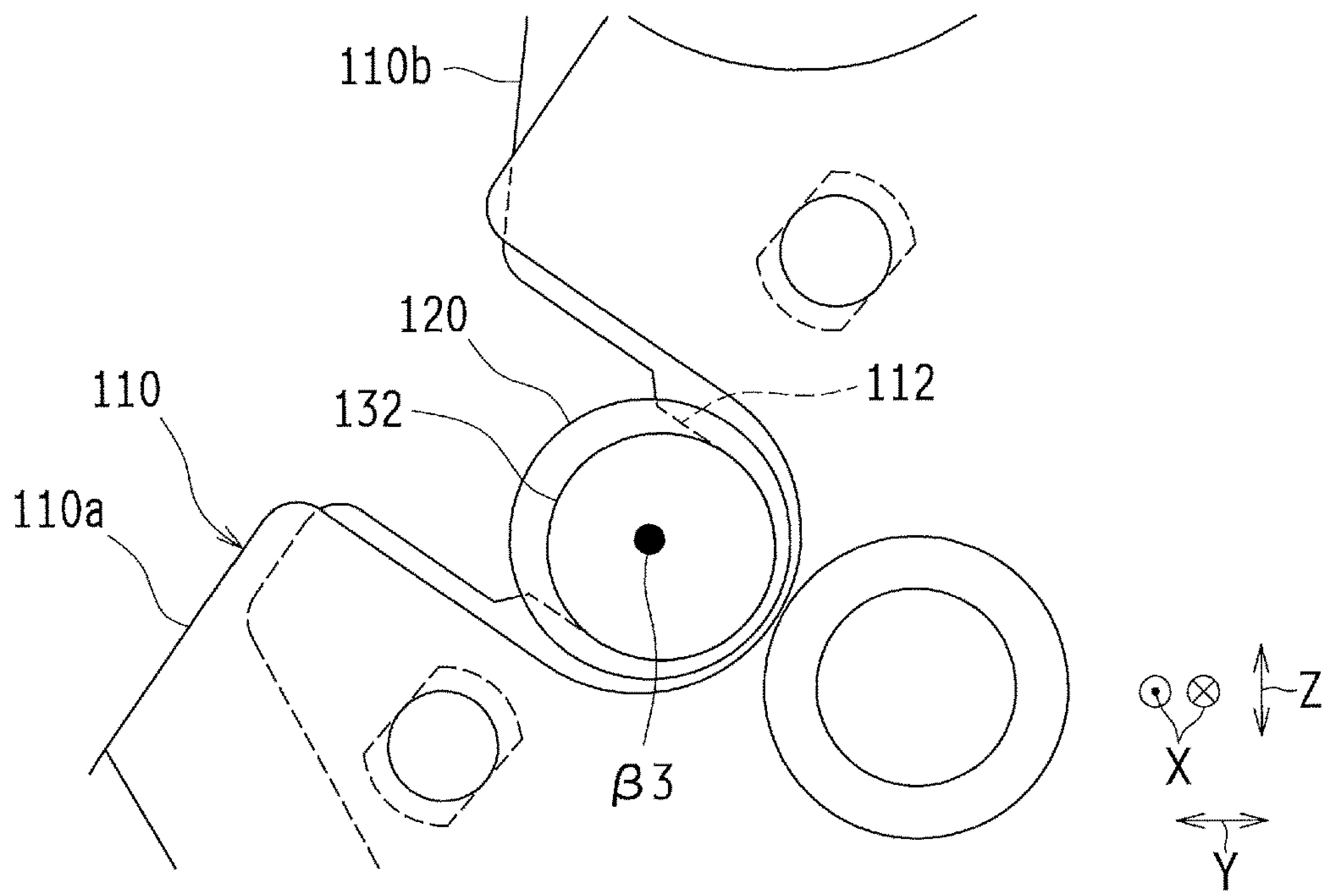
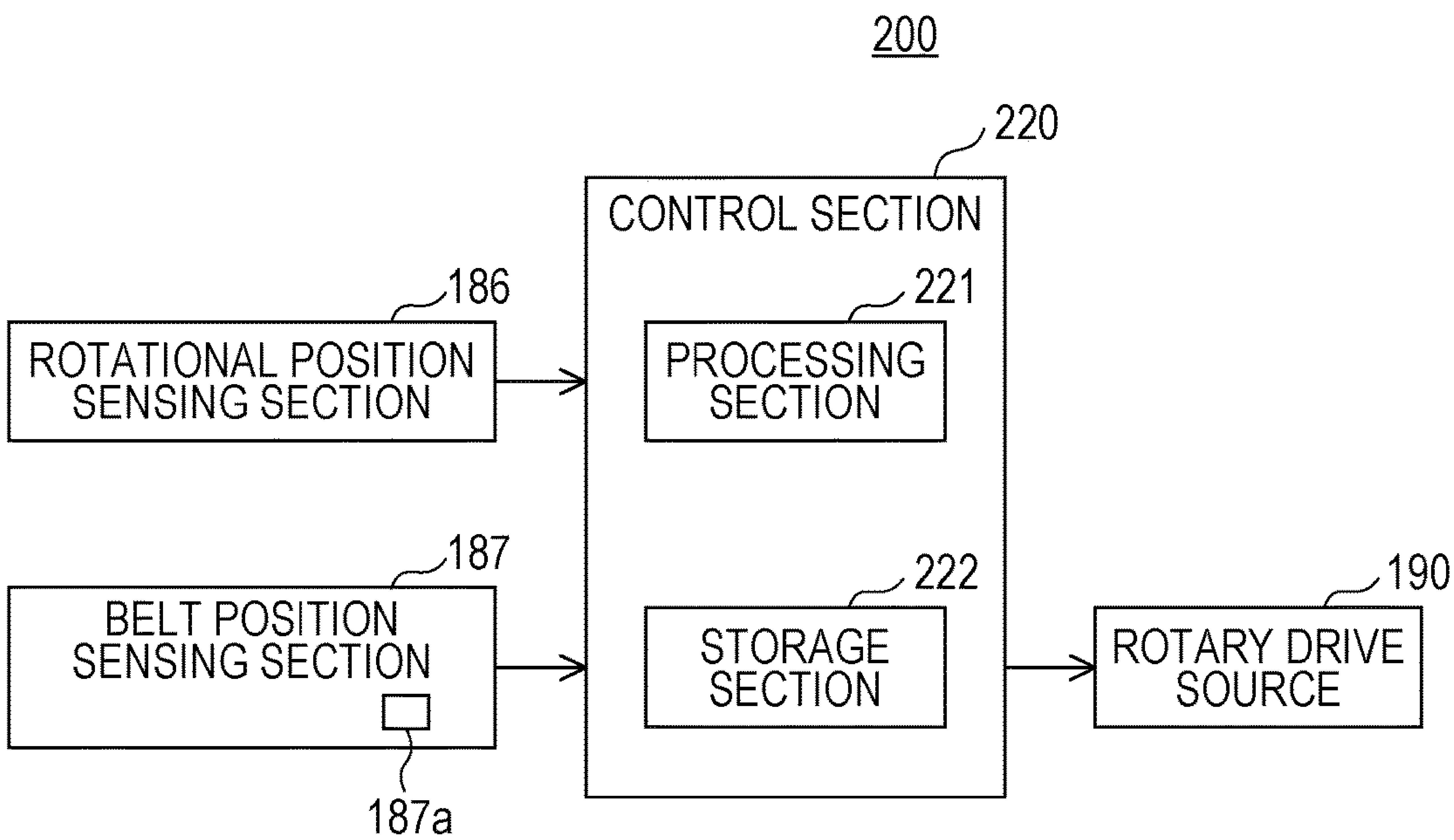


FIG. 17


200
220
CONTROL SECTION
186
ROTATIONAL POSITION SENSING SECTION
221
PROCESSING SECTION
187
BELT POSITION SENSING SECTION
187a
222
STORAGE SECTION
190
ROTARY DRIVE SOURCE

BELT DEVIATION CORRECTION DEVICE FIXING DEVICE, IMAGE FORMING APPARATUS, AND BELT DEVIATION CORRECTION METHOD

BACKGROUND

1. Field

The present disclosure relates to a belt deviation correction device, a fixing device, an image forming apparatus such as a copying machine, a multifunctional machine, a printer, or a facsimile apparatus, and a belt deviation correction method.

2. Description of the Related Art

An endless belt wound around a plurality of belt rollers often deviates in a cross direction orthogonal to a direction of revolution of the belt, for example, due to variation among components. For this reason, there has conventionally been proposed means for correcting a belt deviation. For example, in order to correct a belt deviation of an endless belt that is stretched over a plurality of rollers and driven to rotate, Japanese Unexamined Patent Application Publication No. 2012-198293 discloses a configuration in which at least one of the plurality of rollers over which the endless belt is stretched is tilted (see paragraph [0034] and FIGS. 4 and 5 of Japanese Unexamined Patent Application Publication No. 2012-198293).

However, the configuration described in Japanese Unexamined Patent Application Publication No. 2012-198293, in which at least one of the plurality of rollers over which the endless belt is stretched is tilted, complicates the configuration of members for correcting a belt deviation, inviting an increase in size of the device accordingly.

SUMMARY

It is desirable to provide a belt deviation correction device, a fixing device, an image forming apparatus, and a belt deviation correction method that make it possible to, in correcting a deviation of an endless belt wound around a plurality of belt rollers, simplify the configuration of members for correcting a belt deviation and thereby achieve a reduction in size of the device.

It is desirable to provide the following belt deviation correction device, the following fixing device, the following image forming apparatus, and the following belt deviation correction method.

(1) Belt Deviation Correction Device

According to an aspect of the disclosure, there is provided a belt deviation correction device for correcting a deviation of an endless belt wound around a plurality of rollers, including: a pressing roller that is pressed from outside the endless belt wound around the plurality of rollers, wherein the pressing roller is configured to swing in such a way as to be inclined with respect to the plurality of rollers, and a deviation of the endless belt in a direction of an axis of rotation of the plurality of rollers is corrected by swinging the pressing roller.

(2) Fixing Device

According to an aspect of the disclosure, there is provided a fixing device including: the belt deviation correction device according to the present disclosure, wherein the plurality of rollers include a fixing roller and a heating roller, the pressing roller is a pressure roller, and the endless belt is a fixing belt.

(3) Image Forming Apparatus

According to an aspect of the disclosure, there is provided an image forming apparatus including the belt deviation correction device according to the present disclosure; or the fixing device according to the present disclosure.

(4) Belt Deviation Correction Method

According to an aspect of the disclosure, there is provided a belt deviation correction method for correcting a deviation of an endless belt wound around a plurality of rollers, including: correcting a deviation of the endless belt in a direction of an axis of rotation of the plurality of rollers by swinging a pressing roller so that the pressing roller is inclined with respect to the plurality of rollers, the pressing roller being pressed from outside the endless belt wound around the plurality of rollers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic cross-sectional view of an image forming apparatus including a fixing device having a drive mechanism according to an embodiment of the present disclosure as seen from the front;

FIG. **2** is a front view schematically showing a configuration of the fixing device shown in FIG. **1**;

FIG. **3** is a plan view schematically showing the configuration of the fixing device shown in FIG. **1**;

FIG. **4** is a schematic front view of the drive mechanism, a drive transmission mechanism, and a rotary drive source in the fixing device shown in FIG. **1**;

FIG. **5** is a schematic partially-enlarged cross-sectional view showing a first cam and a first engagement part of the drive mechanism shown in FIG. **4**;

FIG. **6** is a schematic partially-enlarged cross-sectional view showing a second cam and a second engagement part of the drive mechanism shown in FIG. **4**;

FIG. **7** is a schematic perspective view of the drive mechanism shown in FIG. **4** as seen obliquely from above in the direction of a second side;

FIG. **8** is a schematic perspective view of a part of the drive mechanism shown in FIG. **4** on a first side in a cross direction as seen obliquely from above in the direction of the first side;

FIGS. **9**A and **9**B are diagrams showing a removable member constituting an actuated member in the drive mechanism shown in FIG. **4**, FIGS. **9**A and **9**B being schematic front and rear views, respectively, of the removable member constituting the actuated member;

FIG. **10** is a schematic perspective view of the first and second cams provided on a rotary drive shaft on the first side of the drive mechanism shown in FIG. **4** as seen obliquely from above in the direction of the first side;

FIGS. **11**A and **11**B are diagrams showing a state where, in a pressed state of a pressure roller against a fixing roller in the drive mechanism shown in FIG. **4**, the first side of the pressure roller is inclined to move in a first direction of swinging directions, FIG. **11**A being a schematic partial front view of the first cam and the first engagement part, FIG. **11**B being a schematic partial cross-sectional view of the second cam and the second engagement part;

FIGS. **12**A and **12**B are enlarged views showing an operating state of the drive mechanism shown in FIGS. **11**A and **11**B, FIG. **12**A being a schematic partially-enlarged front view showing the first cam and the first engagement part shown in FIG. **11**A, FIG. **12**B being a schematic partially-enlarged cross-sectional view showing the second cam and the second engagement part shown in FIG. **11**B;

FIGS. **13**A and **13**B are diagrams showing a state where, in a pressed state of the pressure roller against the fixing roller in the drive mechanism shown in FIG. **4**, the first side of the pressure roller is inclined to move in a second direction of the swinging directions, FIG. **13**A being a schematic partial front view of the first cam and the first engagement part, FIG. **13**B being a schematic partial cross-sectional view of the second cam and the second engagement part;

FIGS. **14**A and **14**B are enlarged views showing an operating state of the drive mechanism shown in FIGS. **13**A and **13**B, FIG. **14**A being a schematic partially-enlarged front view showing the first cam and the first engagement part shown in FIG. **13**A, FIG. **14**B being a schematic partially-enlarged cross-sectional view showing the second cam and the second engagement part shown in FIG. **13**B;

FIGS. **15**A and **15**B are diagrams showing a state where, in a pressed state of the pressure roller against the fixing roller in the drive mechanism shown in FIG. **4**, the pressure roller is parallel to the fixing roller, FIG. **15**A being a schematic partial front view of the first cam and the first engagement part, FIG. **15**B being a schematic partial cross-sectional view of the second cam and the second engagement part;

FIGS. **16**A and **16**B are enlarged views showing an operating state of the drive mechanism shown in FIGS. **15**A and **15**B, FIG. **16**A being a schematic partially-enlarged front view showing the first cam and the first engagement part shown in FIG. **15**A, FIG. **16**B being a schematic partially-enlarged cross-sectional view showing the second cam and the second engagement part shown in FIG. **15**B; and

FIG. **17** is a system block diagram schematically showing a configuration of a control system of an image forming apparatus according to the present embodiment.

DESCRIPTION OF THE EMBODIMENTS

The following describes an embodiment of the present disclosure with reference to the drawings. The following descriptions assigns identical components identical signs. The same applies to their names and functions. Therefore, a detailed description of them is not repeated.

Overall Configuration of Image Forming Apparatus

FIG. **1** is a schematic cross-sectional view of an image forming apparatus **200** including a fixing device **17** having a drive mechanism **100** according to an embodiment of the present disclosure as seen from the front. It should be noted that the sign X represents a cross direction (depth direction), the sign Y represents a horizontal direction Y that is orthogonal to the cross direction X, and the sign Z represents a vertical direction. The same applies to FIGS. **2** to **16**B described below.

The image forming apparatus **200** shown in FIG. **1** is a color image forming apparatus that electrophotographically forms multicolor and monochromatic images onto sheets P such as recording paper in accordance with image data read by an image reading device **90** or image data transmitted from an outside source. It should be noted that the image forming apparatus **200** may be a monochromatic image forming apparatus. Alternatively, the image forming apparatus **200** may be a color image forming apparatus of another form.

The image forming apparatus **200** includes a document feed device **208** and an image forming apparatus main body **210**, and the image forming apparatus main body **210** is provided with an image forming section **202** and a sheet conveyance system **203**.

The image forming section **202** includes an exposure device **1**, a plurality of developing devices **2**, a plurality of photoreceptor drums **3**, a plurality of photoreceptor cleaner sections **4**, a plurality of chargers **5**, a primary transfer belt device **6**, a plurality of toner cartridge devices **21**, and the fixing device **17**. Further, the sheet conveyance system **203** includes a paper feed tray **81**, a manual paper feed tray **82**, and a paper output tray **15**.

Provided on top of the image forming apparatus main body **210** is a document platen **92**, made of transparent glass, on which a document (not illustrated) is placed. Provided below the document platen **92** is the image reading device **90**, which is used to read an image of a document. Further, the document feed device **208** is provided on an upper side of the document platen **92**. An image of a document as read by the image reading device **90** is sent as image data to the image forming apparatus main body **210**, and an image formed on the basis of the image data is recorded onto a sheet P in the image forming apparatus main body **210**.

Image data that is handled in the image forming apparatus **200** corresponds to a color image having a plurality of colors (which, in this example, are black (K), cyan (C), magenta (M), and yellow (Y)). Therefore, the plurality of (in this example, four) developing devices **2**, the plurality of (in this example, four) photoreceptor drums **3**, the plurality of (in this example, four) photoreceptor cleaner sections **4**, the plurality of (in this example, four) chargers **5**, and the plurality of (in this example, four) toner cartridge devices **21** are configured to form plural types (in this example, four types) of image corresponding to the respective colors (which, in this example, are black, cyan, magenta, and yellow), and constitute a plurality of (in this example, four) image forming stations.

In forming an image in the image forming apparatus **200**, a sheet P is fed from the paper feed tray **81** or the manual paper feet tray **82** and conveyed to a registration roller **13** by conveying rollers **12***a* provided along a sheet conveyance path S. Next, the sheet P is conveyed by a secondary transfer belt device **10** at such a timing that the sheet P and a toner image on a primary transfer belt **61** that moves around in a direction of revolution M in the primary transfer belt device **6** match, and the toner image is transferred onto the sheet P. After that, unfixed toner on the sheet P is thermally fused and fixed by passing the sheet P through a space between a fixing roller **171** and a pressure roller **172** in the fixing device **17**, and the sheet P is ejected onto the paper output tray **15** via the conveying rollers **12***a* and a paper output roller section **31**. Further, in a case where the image forming apparatus **200** forms an image on the back side of the sheet P as well as the front side, the sheet P is conveyed from the paper output roller section **31** in the opposite direction to a reversal path Sr, guided again toward the registration roller **13** with its front and back sides reversed via a conveying roller **12***b*, and ejected onto the output tray **15** with a toner image fixed on the back side of the sheet P as in the case of the front side of the sheet P. Thus, the image forming apparatus **200** completes a series of printing actions.

It should be noted that it is also possible to form a monochromatic image with use of at least one of the four image forming stations and transfer the monochromatic image onto the primary transfer belt **61** of the primary transfer belt device **6**. As with a color image, this monochromatic image is transferred from the first transfer belt **61** to a sheet P and fixed onto the sheet P.

Fixing Device

The following describes an example in which a belt deviation correction device **300** according to the present embodiment is applied to the fixing device **17**, which conforms to a belt fixing method.

FIGS. **2** and **3** are front and plan views, respectively, schematically showing a configuration of the fixing device **17** shown in FIG. **1**. Further, FIG. **4** is a schematic front view of the drive mechanism **100**, a drive transmission mechanism **180**, and a rotary drive source **190** in the fixing device **17** shown in FIG. **1**. FIG. **4** shows a pressure release state of the pressure roller **172** against the fixing roller **171**. It should be noted that FIGS. **2** and **3** omit to illustrate some of the constituent elements and the like of the drive mechanism **100** shown in FIG. **4**. Further, FIG. **4** omits to illustrate a configuration on a second side (which, in this example, is a rear side), because, as will be described later, the configuration is substantially the same as a configuration on a first side (which, in this example, is a front side) except for a configuration for swinging the pressure roller **172** in swinging directions W. The same applies to FIG. **5**, FIG. **6**, FIG. **7**, and FIGS. **10** to **16**B described below.

In the present embodiment, as shown in FIGS. **2** to **4**, the drive mechanism **100** includes a first roller (which, in this example, is the fixing roller **171**) and a second roller (which, in this example, is the pressure roller **172**). The second roller clamps a conveyed body (which, in this example, is a fixing belt **173**) against the first roller.

Further, in the present embodiment, the drive mechanism **100** further includes a third roller (which, in this example, is a heating roller **174**). The conveyed body (which, in this example, is the fixing belt **173**) is an endless belt that is wound around the first roller (which, in this example, is the fixing roller **171**) and the third roller (which, in this example, is the heating roller **174**).

Specifically, the fixing device **17** includes a plurality of (in this example, two) rollers (which, in this example, are the fixing roller **171** and the heating roller **174**) including the fixing roller **171** and the endless fixing belt **173** wound around the fixing roller **171** and the heating roller **174**.

The fixing device **17** further includes the pressure roller **172** so that a fixing nip zone N (which is an example of a nip section) is formed between the fixing belt **173** and the pressure roller **172** in a state where the fixing roller **171** and the pressure roller **172** are pressed against each other by a biasing member **175** (which, in this example, is a pressure spring such as a coil spring) with the fixing belt **173** therebetween. The fixing device **17** further includes the drive mechanism **100**. As will be described later, the drive mechanism **100** acts as means for pressing the pressure roller **172** against the fixing roller **171**, adjusting the pressure of the pressure roller **172** against the fixing roller **171**, and releasing the pressure roller **172** from being pressed against the fixing roller **171** and acts as means for correcting a deviation of the fixing belt **173**. It should be noted that the drive mechanism **100** will be described in detail later.

The fixing roller **171** is configured to face an unfixed toner image T on a sheet P with the fixing belt **173** interposed therebetween, and the heating roller **174** is configured to heat the fixing belt **173**.

Specifically, the fixing roller **171** has a rotating shaft **171***a* rotatably provided in a main body (specifically, a main body frame FL) of the fixing device **17** via bearings **171***b*. The fixing roller **171** faces the unfixed toner image T on the sheet P between the fixing belt **173** and the pressure roller **172** while clamping the fixing belt **173** together with the pressure roller **172** and fixes the unfixed toner image T. The fixing roller **171** has an elastic layer **171***c* (e.g. an elastic layer made of a rubber member such as silicone rubber).

The pressure roller **172** has a rotating shaft **172***a* rotatably provided in an actuated member **110** via bearings **110***d*. The pressure roller **172** has an elastic layer **172***b* (e.g. an elastic layer made of a rubber member such as silicone rubber).

The fixing belt **173** includes a substrate (not illustrated) (e.g. a substrate made of metal such as nickel) and an elastic layer (e.g. an elastic layer made of a rubber member such as silicone rubber) (not illustrated) provided on the substrate.

Further, the heating roller **174** has a rotating shaft **174***a* rotatably provided in the main body (specifically, the main body frame FL) of the fixing device **17** via bearings **174***b*. The heating roller **174** includes a heat source **178** such as a halogen heater, and by being heated by the heat source **178**, the heat roller **174** heats the fixing belt **173**. The heating roller **174** includes a cylindrical cored bar. The heat source **178**, which heats the heating roller **174**, is provided inside the heating roller **174**. As a result of that, the heating roller **174** is heated by the heat source **178** and the fixing belt **173** is heated by the transmission of heat from the heating roller **174** to the fixing belt **173**. The heating roller **174** has a metallic tube **174***c* (e.g. an aluminum tube).

In a state where the fixing device **17** described above is fitted in the image forming apparatus main body **210**, a drive mechanism (not illustrated) such as gears on the side of the image forming apparatus main body **210** intermesh with gears (not illustrated) provided in the rotation shaft **171***a* of the fixing roller **171** and the transmission of rotary drive force from the drive mechanism on the side of the image forming apparatus main body **210** to the rotating shaft **171***a* of the fixing roller **171** via the gears drives the fixing roller **171** to rotate in a predetermined direction of rotation E**1**. As the fixing roller **171** rotates, the fixing belt **173** moves around in a direction of revolution E, which is the same direction as the direction of rotation E**1** of the fixing roller **171**, and the heating roller **174** rotates in the direction of rotation E**1**; furthermore, the pressure roller **172** is driven to rotate in a direction E**2** opposite to the direction of rotation E**1** of the fixing roller **171**. Moreover, a sheet P being conveyed in a sheet conveyance direction H with an unfixed toner image T formed thereon is received, conveyed by being held between the fixing belt **173** and the pressure roller **172**, and heated under pressure in the fixing nip zone N. Thus, the unfixed toner image T on the sheet P is fused, mixed, pressed, and thermally fixed.

It should be noted that the fixing device **17** may include a tension roller that is placed inside or outside the fixing belt **173** and presses the fixing belt **173** outward or inward so as to apply tension to the fixing belt **173**. Instead of or in addition to the tension roller, the fixing device **17** may include biasing members (e.g. coil springs) that apply biasing force to both ends of the rotating shaft **174***a* of the heating roller **174** toward a side opposite to the fixing roller **171**. The fixing roller **171** and/or the pressure roller **172** may be provided with a heat source(s) **178**. Further, in a case where the tension roller is provided, the tension roller may be provided with a heat source **178**. Further, in a case where the fixing belt **173** is further wound around other rollers, at least one of the other rollers may be provided with a heat source **178**.

Belt Deviation Correction Device

The fixing device **17** includes a plurality of rollers (which, in this example, are the fixing roller **171** and the heating roller **174**) and an endless belt (which, in this example, is the fixing belt **173**). The fixing belt **173** is wound around the fixing roller **171** and the heating roller **174**. The fixing belt

173 is configured to be able to transmit heat from the heating roller **174** to the fixing roller **171**. The fixing device **17** further includes a pressing roller (which, in this example, is the pressure roller **172**). The pressure roller **172** is pressed from outside the fixing belt **173** wound around the fixing roller **171** and the heating roller **174**. In this example, the fixing device **17** is configured such that the pressure roller **172** is pressed against the fixing roller **171** with the fixing belt **173** interposed therebetween. Further, the fixing belt **173** is configured to be heated by the heat source **178** provided inside the heating roller **174** and maintained at a predetermined fixing temperature in accordance with a signal from a temperature sensing section **177** (specifically, a temperature sensor such as a thermistor).

Moreover, the pressure roller **172** is configured to swing so as to be inclined with respect to the fixing roller **171** and the heating roller **174**. The fixing roller **17** is configured such that a deviation of the fixing belt **173** in the direction of an axis of rotation β1 of the fixing roller **171** and the heating roller **174** is corrected by swinging the pressure roller **172**.

The present embodiment swings the pressure roller **172**, which is pressed from outside the fixing belt **173**, in order to correct a belt deviation of the fixing belt **173**. This makes it possible to simplify the configuration of members for correcting a belt deviation, thereby making it possible to achieve a reduction in size of the device.

Drive Mechanism

The drive mechanism serves to drive a plurality of actuated parts that are different from each other. Incidentally, there has conventionally been known a drive mechanism that drives a plurality of actuated parts that are different from each other (see, for example, Japanese Unexamined Patent Application Publication No. 2014-115585).

Specifically, Japanese Unexamined Patent Application Publication No. 2014-115585 discloses a configuration in which a meandering (deviation) of a medium on which recording is performed is corrected through adjusting the entire pressing load of a pressure roller by rotating a moving cam within a moving cam through-hole via a moving cam shaft by means of a moving cam motor and moving a pressing cam mechanism section toward the pressure roller via a moving cam plate and through adjusting the lateral balance of the pressing load of the pressure roller against a heating roller via an arm member by rotating a pair of pressing cams that are different in phase from each other in accordance with a detection signal from a meandering amount detector by means of a pressing cam motor.

That is, the configuration described in Japanese Unexamined Patent Application Publication No. 2014-115585 is such that two drive sources (i.e. the pressing cam motor and the moving cam motor) rotate the pair of pressing cams and the moving cam to actuate the arm member (pressing actuated part) and the moving cam plate (moving actuated part), respectively.

However, in a conventional drive mechanism such as that described in Japanese Unexamined Patent Application Publication No. 2014-115585, drive sources are individually provided for a plurality of actuated parts. This makes it difficult to reduce the size of the drive mechanism. Moreover, this complicates a control configuration for individually actuating the plurality of actuated parts.

Accordingly, it is desirable to achieve a reduction in size of a drive mechanism that drives a plurality of actuated parts that are different from each other and simplify a control configuration for individually actuating the plurality of actuated parts.

In this respect, in the present embodiment, the drive mechanism **100** serves to drive a plurality of actuated parts (which, in this example, are a first engagement part **111** [which is an example of a first actuated part] and a second engagement part **112** [which is an example of a second actuated part]) that are different from each other in order to swing the pressure roller **172**.

The drive mechanism **100** may include a single drive part (which, in this example, is a rotary drive shaft **120**) and a plurality of actuating parts (which, in this example, are a first cam **131** [which is an example of a first cam] and a second cam **132** (which is an example of a second cam]).

To the single drive part (which, in this example, is the rotary drive shaft **120**), drive force from a single drive source (which, in this example, is the rotary drive source **190**) is transmitted.

The plurality of actuating parts (which, in this example, are the first cam **131** and the second cam **132**) are provided on the single drive part (which, in this example, is the rotary drive shaft **120**) so that in actuating the first actuated part (which, in this example, is the first engagement part **111**) and the second actuated part (which, in this example, is the second engagement part **112**) of the plurality of actuated parts (which, in this example, are the first engagement part **111** and the second engagement part **112**) separately with drive force from the single drive part (which, in this example, is the rotary drive shaft **120**), a first action (which, in this example, is a roller press action) on the first actuated part (which, in this example, is the first engagement part **111**) and a second action (which, in this example, is a belt deviation correction action) on the second actuated part (which, in this example, is the second engagement part **112**) do not affect each other.

The present embodiment, which uses the single drive source (which, in this example, is the rotary drive source **190**) to drive the plurality of actuating parts (which, in this example, are the first cam **131** and the second cam **132**), makes it possible to save space in which to provide the single drive source (which, in this example, is the rotary drive source **190**), thus making it possible to achieve a reduction in size of the drive mechanism **100**. Moreover, the present embodiment makes it possible to achieve a reduction in cost of the drive mechanism **100**. Furthermore, because of the configuration in which in actuating the first actuated part (which, in this example, is the first engagement part **111**) and the second actuated part (which, in this example, is the second engagement part **112**) of the plurality of actuated parts (which, in this example, are the first engagement part **111** and the second engagement part **112**) separately with drive force from the single drive part (which, in this example, is the rotary drive shaft **120**), the first action (which, in this example, is the roller press action) on the first actuated part (which, in this example, is the first engagement part **111**) and the second action (which, in this example, is the belt deviation correction action) on the second actuated part (which, in this example, is the second engagement part **112**) do not affect each other, the first action (which, in this example, is the roller press action) in which a first actuating part (which, in this example, is the first cam **131**) of the plurality of actuating parts (which, in this example, are the first cam **131** and the second cam **132**) actuates the first actuated part (which, in this example, is the first engagement part **111**) and the second action (which, in this example, is the belt deviation correction action) in which a second actuating part (which, in this example, is the second cam **132**) of the plurality of actuating parts (which, in this example, are the first cam **131** and the second cam **132**) actuates the second actuated part (which, in this example, is the second engagement part **112**) can be prevented from affecting each other. Therefore, simply by controlling the single drive source (which, in this example, is the rotary drive source **190**), the first action (which, in this example, is the roller press action) on the first actuated part (which, in this example, is the first engagement part **111**) by the first actuating part (which, in this example, is the first cam **131**) and the second action (which, in this example, is the belt deviation correction action) on the second actuated part (which, in this example, is the second engagement part **112**) by the second actuating part (which, in this example, is the second cam **132**) can be prevented from affecting each other. This makes it possible to simplify a control configuration for individually actuating the plurality of actuated parts (which, in this example, are the first engagement part **111** and the second engagement part **112**).

First to Twelfth Embodiments

Next, first to twelfth embodiments are described below with reference to FIGS. **5** to **17** in addition to FIGS. **1** to **4**.

FIG. **5** is a schematic partially-enlarged cross-sectional view showing the first cam **131** and the first engagement part **111** of the drive mechanism **100** shown in FIG. **4**. FIG. **6** is a schematic partially-enlarged cross-sectional view showing the second cam **132** and the second engagement part **112** of the drive mechanism **100** shown in FIG. **4**. FIG. **7** is a schematic perspective view of the drive mechanism **100** shown in FIG. **4** as seen obliquely from above in the direction of the second side (which, in this example, is the rear side). FIG. **8** is a schematic perspective view of a part of the drive mechanism **100** shown in FIG. **4** on the first side (which, in this example, is the front side) in a cross direction X as seen obliquely from above in the direction of the first side (which, in this example, is the front side).

FIGS. **9**A and **9**B are diagrams showing a removable member **110***b* constituting the actuated member **110** in the drive mechanism **100** shown in FIG. **4**. FIGS. **9**A and **9**B are schematic front and rear views, respectively, of the removable member **110***b* constituting the actuated member **110**.

FIG. **10** is a schematic perspective view of the first and second cams **131** and **132** provided on the rotary drive shaft **120** on the first side of the drive mechanism **100** shown in FIG. **4** as seen obliquely from above in the direction of the first side (which, in this example, is the front side).

FIGS. **11**A and **11**B are diagrams showing a state where, in a pressed state of the pressure roller **172** against the fixing roller **171** in the drive mechanism **100** shown in FIG. **4**, the first side (which, in this example, is the front side) of the pressure roller **172** is inclined to move in a first direction **W1** of the swinging directions W. FIG. **11**A is a schematic partial front view of the first cam **131** and the first engagement part **111**, and FIG. **11**B is a schematic partial cross-sectional view of the second cam **132** and the second engagement part **112**. FIGS. **12**A and **12**B are enlarged views showing an operating state of the drive mechanism **100** shown in FIGS. **11**A and **11**B. FIG. **12**A is a schematic partially-enlarged front view showing the first cam **131** and the first engagement part **111** shown in FIG. **11**A, and FIG. **12**B is a schematic partially-enlarged cross-sectional view showing the second cam **132** and the second engagement part **112** shown in FIG. **11**B.

FIGS. **13**A and **13**B are diagrams showing a state where, in a pressed state of the pressure roller **172** against the fixing roller **171** in the drive mechanism **100** shown in FIG. **4**, the first side (which, in this example, is the front side) of the pressure roller **172** is inclined to move in a second direction **W2** of the swinging directions W. FIG. **13**A is a schematic partial front view of the first cam **131** and the first engagement part **111**, and FIG. **13**B is a schematic partial cross-sectional view of the second cam **132** and the second engagement part **112**. FIGS. **14**A and **14**B are enlarged views showing an operating state of the drive mechanism **100** shown in FIGS. **13**A and **13**B. FIG. **14**A is a schematic partially-enlarged front view showing the first cam **131** and the first engagement part **111** shown in FIG. **13**A, and FIG. **14**B is a schematic partially-enlarged cross-sectional view showing the second cam **132** and the second engagement part **112** shown in FIG. **13**B.

FIGS. **15**A and **15**B are diagrams showing a state where, in a pressed state of the pressure roller **172** against the fixing roller **171** in the drive mechanism **100** shown in FIG. **4**, the pressure roller **172** is parallel to the fixing roller **171**. FIG. **15**A is a schematic partial front view of the first cam **131** and the first engagement part **111**, and FIG. **15**B is a schematic partial cross-sectional view of the second cam **132** and the second engagement part **112**. FIGS. **16**A and **16**B are enlarged views showing an operating state of the drive mechanism **100** shown in FIGS. **15**A and **15**B. FIG. **16**A is a schematic partially-enlarged front view showing the first cam **131** and the first engagement part **111** shown in FIG. **15**A, and FIG. **16**B is a schematic partially-enlarged cross-sectional view showing the second cam **132** and the second engagement part **112** shown in FIG. **15**B.

It should be noted that FIGS. **11**B, **13**B, and **15**B omit to illustrate the fixing roller **171**, the pressure roller **172**, the fixing belt **173**, and the like.

Further, FIG. **17** is a system block diagram schematically showing a configuration of a control system of the image forming apparatus **200** according to the present embodiment.

First Embodiment

In the present embodiment, the first actuating part (which, in this example, is the first cam **131**) of the plurality of actuating parts (which, in this example, are the first cam **131** and the second cam **132**) may have an operating state maintenance region $\gamma 1a$ in which to maintain an operating state of the corresponding first actuated part (which, in this example, is the first engagement part **111**), and the second actuating part (which, in this example, is the second cam **132**) may have an operating state change region $\gamma 2b$ in which to change an operating state of the corresponding second actuated part (which, in this example, is the second engagement part **112**). Moreover, in this configuration, when an operating state of the first action (which, in this example, is the roller press action) on the first actuated part (which, in this example, is the first engagement part **111**) is maintained in the operating state maintenance region $\gamma 1a$ of the first actuating part (which, in this example, is the first cam **131**), an operating state of the second action (which, in this example, is the belt deviation correction action) on the second actuated part (which, in this example, is the second engagement part **112**) may be changed in the operating state change region $\gamma 2b$ of the second actuating part (which, in this example, is the second cam **132**).

This makes it possible to, in actuating the first actuated part (which, in this example, is the first engagement part **111**) and the second actuated part (which, in this example, is the second engagement part **112**) separately, change the operating state of the second action (which, in this example, is the belt deviation correction action) on the second actuated part (which, in this example, is the second engagement part **112**) in the operating state change region γ**2**b of the second actuating part (which, in this example, is the second cam **132**) while maintaining the operating state of the first action (which, in this example, is the roller press action) on the first actuated part (which, in this example, is the first engagement part **111**) in the operating state maintenance region γ**1**a of the first actuating part (which, in this example, is the first cam **131**). This makes it possible, even with a simple configuration in which the first actuating part (which, in this example, is the first cam **131**) has the operating state maintenance region γ**1**a and the second actuating part (which, in this example, is the second cam **132**) has the operating state change region γ**2**b, to prevent the first action (which, in this example, is the roller press action) and the second action (which, in this example, is the belt deviation correction action) from affecting each other.

It should be noted that, in addition to being configured as just described, the drive mechanism **100** according to the present embodiment may be configured such that the first actuating part (which, in this example, is the first cam **131**) of the plurality of actuating parts (which, in this example, are the first cam **131** and the second cam **132**) has an operating state change region γ**1**b in which to change the operating state of the corresponding first actuated part (which, in this example, is the first engagement part **111**), that the second actuating part (which, in this example, is the second cam **132**) has an operating state maintenance region γ**2**a in which to maintain the operating state of the corresponding second actuated part (which, in this example, is the second engagement part **112**), and that when the operating state of the second action (which, in this example, is the belt deviation correction action) on the second actuated part (which, in this example, is the second engagement part **112**) is maintained in the operating state maintenance region γ**2**a of the second actuating part (which, in this example, is the second cam **132**), the operating state of the first action (which, in this example, is the roller press action) on the first actuated part (which, in this example, is the first engagement part **111**) is changed in the operating state change region γ**1**b of the first actuating part (which, in this example, is the first cam **131**).

This makes it possible to, in actuating the first actuated part (which, in this example, is the first engagement part **111**) and the second actuated part (which, in this example, is the second engagement part **112**) separately, change the operating state of the first action (which, in this example, is the roller press action) on the first actuated part (which, in this example, is the first engagement part **111**) in the operating state change region γ**1**b of the first actuating part (which, in this example, is the first cam **131**) while maintaining the operating state of the second action (which, in this example, is the belt deviation correction action) on the second actuated part (which, in this example, is the second engagement part **112**) in the operating state maintenance region γ**2**a of the second actuating part (which, in this example, is the second cam **132**). This makes it possible, even with a simple configuration in which the first actuating part (which, in this example, is the first cam **131**) has the operating state change region γ**1**b and the second actuating part (which, in this example, is the second cam **132**) has the operating state maintenance region γ**2**a, to prevent the first action (which, in this example, is the roller press action) and the second action (which, in this example, is the belt deviation correction action) from affecting each other.

Therefore, the first action (which, in this example, is the roller press action) of the first actuating part (which, in this example, is the first cam **131**) on the first actuated part (which, in this example, is the first engagement part **111**) and the second action (which, in this example, is the belt deviation correction action) of the second actuating part (which, in this example, is the second cam **132**) on the second actuated part (which, in this example, is the second engagement part **112**) can be alternately performed. That is, when a first operating state is maintained, a second operating state can be changed; in other words, when the second operating state is changed, the first operating state can be maintained. In addition, when the second operating state is maintained, the first operating state can be changed; in other words, when the first operating state is changed, the second operating state can be maintained.

Second Embodiment

The present embodiment may be configured such that when the operating state of the first action (which, in this example, is the roller press action) on the first actuated part (which, in this example, is the first engagement part **111**) is changed in the operating state change region γ**1**b of the first actuating part (which, in this example, is the first cam **131**), the second action (which, in this example, is the belt deviation correction action) on the second actuated part (which, in this example, is the second engagement part **112**) by the second actuating part (which, in this example, is the second cam **132**) is not performed.

This makes it possible not to perform the second action (which, in this example, is the belt deviation correction action) on the second actuated part (which, in this example, is the second engagement part **112**) by the second actuating part (which, in this example, is the second cam **132**) while changing the operating state of the first action (which, in this example, is the roller press action) of the first actuating part (which, in this example, is the first cam **131**) on the first actuated part (which, in this example, is the first engagement part **111**). This makes it possible, even with a simple configuration in which the first actuating part (which, in this example, is the first cam **131**) has the operating state change region γ**1**b, to prevent the first action (which, in this example, is the roller press action) and the second action (which, in this example, is the belt deviation correction action) from affecting each other.

Therefore, in this case, too, the first action (which, in this example, is the roller press action) of the first actuating part (which, in this example, is the first cam **131**) on the first actuated part (which, in this example, is the first engagement part **111**) and the second action (which, in this example, is the belt deviation correction action) of the second actuating part (which, in this example, is the second cam **132**) on the second actuated part (which, in this example, is the second engagement part **112**) can be alternately performed. That is, when the first operating state is maintained, the second operating state can be changed; in other words, when the second operating state is changed, the first operating state can be maintained. In addition, when the second operating state is maintained, the first operating state can be changed; in other words, when the first operating state is changed, the second operating state can be maintained.

Third Embodiment

In the present embodiment, the single drive source may be the rotary driver source **190**, which outputs rotary drive force, and the single drive part may be the rotary drive shaft **120**, to which the rotary drive force from the rotary drive source **190** is transmitted.

At least two actuating parts of the plurality of actuating parts may be constituted by cams (which, in this example, are the first cam **131** and the second cam **132**). A first cam (which, in this example, is the first cam **131**) and a second cam (which, in this example, is the second cam **132**) of the at least two cams may be provided on the rotary drive shaft **120** so that the first action (which, in this example, is the roller press action) in which the first cam (which, in this example, is the first cam **131**) actuates the first actuated part (which, in this example, is the first engagement part **111**) and the second action (which, in this example, is the belt deviation correction action) in which the second cam (which, in this example, is the second cam **132**) actuates the second actuated part (which, in this example, is the second engagement part **112**) do not affect each other.

This makes it possible to, in actuating the first actuated part (which, in this example, is the first engagement part **111**) and the second actuated part (which, in this example, is the second engagement part **112**) separately, drive the first cam (which, in this example, is the first cam **131**) and the second cam (which, in this example, is the second cam **132**) to rotate on an axis of rotation of the rotary drive shaft **120** with rotary drive force from the rotary drive source **190** in a state where the first action (which, in this example, is the roller press action) by the first cam (which, in this example, is the first cam **131**) and the second action (which, in this example, is the belt deviation correction action) by the second cam (which, in this example, is the second cam **132**) do not affect each other. This makes it possible, even with a simple configuration in which the first cam (which, in this example, is the first cam **131**) and the second cam (which, in this example, is the second cam **132**) provided on the rotary drive shaft **120** are used, to prevent the first action (which, in this example, is the roller press action) and the second action (which, in this example, is the belt deviation correction action) from affecting each other.

Fourth Embodiment

In the present embodiment, the first cam (which, in this example, is the first cam **131**) and the second cam (which, in this example, is the second cam **132**) may be provided on the rotary drive shaft **120** so that a displacement of a diameter r**1** of the first cam (which, in this example, is the first cam **131**) and a displacement of a diameter (radius r**2**) of the second cam (which, in this example, is the second cam **132**) are not in phase (or are out of phase) with each other.

This makes it possible to, in actuating the first actuated part (which, in this example, is the first engagement part **111**) and the second actuated part (which, in this example, is the second engagement part **112**) separately, prevent the displacement of the diameter r**1** of the first cam (which, in this example, is the first cam **131**) and the displacement of the diameter (radius r**2**) of the second cam (which, in this example, is the second cam **132**) from being in phase with each other. This makes it possible to easily achieve a configuration in which the first action (which, in this example, is the roller press action) in which the first cam (which, in this example, is the first cam **131**) actuates the first actuated part (which, in this example, is the first engagement part **111**) and the second action (which, in this example, is the belt deviation correction action) in which the second cam (which, in this example, is the second cam **132**) actuates the second actuated part (which, in this example, is the second engagement part **112**) do not affect each other.

Specifically, the first cam (which, in this example, is the first cam **131**) and the second cam (which, in this example, is the second cam **132**) can be provided on the rotary drive shaft **120** so that the first cam (which, in this example, is the first cam **131**) and the second cam (which, in this example, is the second cam **132**) are out of phase with each other by a predetermined angle (e.g. 180 degrees) so as to alternate in phase with each other.

Fifth Embodiment

The present embodiment may further include the actuated member **110** (specifically, a supporting member or, in this example, a pressure lever), in which the first actuated part (which, in this example, is the first engagement part **111**) and the second actuated part (which, in this example, is the second engagement part **112**) are provided. The first cam (which, in this example, is the first cam **131**) may cause the actuated member **110** to reciprocate in first directions of reciprocation (which, in this example, are turning directions V) by means of the first actuated part (which, in this example, is the first engagement part **111**). The second cam (which, in this example, is the second cam **132**) may cause the actuated member **110** to reciprocate in second directions of reciprocation (which, in this example, are the swinging directions W) that are different from the first directions of reciprocation (which, in this example, are the turning directions V) by means of the second actuated part (which, in this example, is the second engagement part **112**).

This makes it possible for the first cam (which, in this example, is the first cam **131**) to cause the actuated member **110** to reciprocate in the first directions of reciprocation (which, in this example, are the turning directions V) by means of the first actuated part (which, in this example, is the first engagement part **111**) and for the second cam (which, in this example, is the second cam **132**) to cause the actuated member **110** to reciprocate in the second directions of reciprocation (which, in this example, are the swinging directions W) by means of the second actuated part (which, in this example, is the second engagement part **112**). This makes it possible to easily actuate the actuated member **110** with use of the first actuated part (which, in this example, is the first engagement part **111**) and the second actuated part (which, in this example, is the second engagement part **112**) provided in the actuated member **110**.

Sixth Embodiment

In the present embodiment, the first directions of reciprocation may include the turning directions V of turning around an axis of turning β**4** that is parallel or substantially parallel to the direction (which, in this example, is the cross direction X) of an axis of rotation β**3** of the rotary drive shaft **120**. The second directions of reciprocation may include the swinging directions W of swinging around an axis of swinging β**5** that intersects (or, specifically, is orthogonal to or substantially orthogonal to) the axis of turning β**4**. Moreover, the actuated member **110** may be configured to be turnable in the turning directions V and swingable in the swinging directions W.

This makes it possible to turn the actuated member **110** in the turning directions V and swing the actuated member **110** in the swinging directions W. This makes it possible to move the actuated member **110** in a plurality of directions that are different from one another.

Seventh Embodiment

In the present embodiment, the actuated member **110** may include a main body member **110***a* in which the first actuated part (which, in this example, is the first engagement part **111**) is provided and the removable member **110***b* (which, in this example, is a swinging guide), removably provided in the main body member **110***a*, in which the second actuated part (which, in this example, is the second engagement part **112**) is provided.

This makes it possible to removably provide the removable member **110***b*, in which the second actuated part (which, in this example, is the second engagement part **112**) is provided, in the main body member **110***a*, in which the first actuated part (which, in this example, is the first engagement part **111**) is provided. This makes it possible to improve the workability of mounting of the rotary drive shaft **120**, on which the first cam (which, in this example, is the first cam **131**) and the second cam (which, in this example, is the second cam **132**) are provided, and the actuated member **110**, in which the first actuated part (which, in this example, is the first engagement part **111**) and the second actuated part (which, in this example, is the second engagement part **112**) are provided.

Eighth Embodiment

In the present embodiment, the actuated member **110** may be a pair of actuated members **110** located on both sides of the rotary drive shaft **120** in the direction of the axis of rotation β**3**.

Incidentally, in a case where the actuated member **110** includes a pair of actuated members **110** located on both sides of the rotary drive shaft **120** in the direction of the axis of rotation β**3**, using a single cam as the first cam makes it difficult to certainly cause the pair of actuated members **110** to reciprocate in the same direction of the first directions of reciprocation (which, in this example, are the turning directions V).

In this respect, in the present embodiment, the first cam (which, in this example, is the first cam **131**) may be a pair of first cams (which, in this example, is a pair of first cams **131**) provided on both sides of the rotary drive shaft **120** in the direction of the axis of rotation β**3** and be configured to cause the pair of actuated members **110** to reciprocate in the same direction of the first directions of reciprocation (which, in this example, are the turning directions V) when the rotary drive shaft **120** is driven to rotate on the axis of rotation β**3**.

This makes it possible, with the pair of first cams **131** provided as the first cam on both sides of the rotary drive shaft **120** in the direction of the axis of rotation β**3**, to certainly cause the pair of actuated members **110** to reciprocate in the same direction of the first directions of reciprocation (which, in this example, are the turning directions V) when the rotary drive shaft **120** is driven to rotate on the axis of rotation β**3**. This makes it possible to certainly cause the first actuated parts (which, in this example, are the first engagement parts **111**) of the pair of actuated members **110** to operate in the same direction of the first directions of reciprocation (which, in this example, are the turning directions V) on both sides of the rotary drive shaft **120** in the direction of the axis of rotation β**3**. In this case, those parts of the pair of actuated members **110** which at least come into contact with the first actuated parts (which, in this example, are the first engagement parts **111**) may be identical or substantially identical in shape to each other, the pair of first cams **131** may be identical or substantially identical in shape to each other, and the displacements of the diameters r**1** of the pair of first cams **131** may be identical or substantially identical in phase to each other.

Ninth Embodiment

Incidentally, in a case where the actuated member **110** includes a pair of actuated members **110** located on both sides of the rotary drive shaft **120** in the direction of the axis of rotation β**3**, it is possible to use a single cam or a pair of cams as the second cam.

In the present embodiment, the second cam may be a single second cam **132** provided on one side (which, in this example, is the front side) of the rotary drive shaft **120** in the direction of the axis of rotation β**3**. The second cam may be configured to cause that one (which, in this example, is a front one) of the pair of actuated members **110** on which the single second cam **132** is provided to reciprocate in the second directions of reciprocation (which, in this example, are the swinging directions W).

This makes it possible that even when the single second cam **132** provided on one side (which, in this example, is the front side) of the rotary drive shaft **120** in the direction of the axis of rotation β**3** is used as the second cam, the single second cam **132** certainly causes that one (which, in this example, is the front one) of the pair of actuated members **110** on which the single second cam **132** is provided to reciprocate in the second directions of reciprocation (which, in this example, are the swinging directions W). This makes it possible to cause the second actuated part (which, in this example, is the second engagement part **112**) of the actuated member **110** to operate without a hindrance in the second directions of reciprocation (which, in this example, are the swinging directions W) on one side (which, in this example, is the front side) of the rotary drive shaft **120** in the direction of the axis of rotation β**3**.

Tenth Embodiment

Note here that, although not illustrated, the present embodiment may be configured such that the second cam includes a pair of second cams **132** provided on both sides of the rotary drive shaft **120** in the direction of the axis of rotation β**3** and is configured to cause the pair of actuated members **110** to reciprocate in opposite directions W**1** and W**2** of the second directions of reciprocation (which, in this example, are the swinging directions W) when the rotary drive shaft **120** is driven to rotate on the axis of rotation β**3**. In other words, a first second cam **132** of the pair of second cams **132** causes a first actuated member **110** of the pair of actuated members **110** to move in the first direction W**1** of the second directions of reciprocation (which, in this example, are the swinging directions W), and a second cam **132** of the pair of second cams **132** causes a second actuated member **110** of the pair of actuated members **110** to move in a second direction W**2** of the second directions of reciprocation (which, in this example, are the swinging directions W); meanwhile, the first second cam **132** causes the first actuated member **110** to move in the second direction W**2** of the second directions of reciprocation (which, in this example, are the swinging directions W), and the second cam **132** causes the second actuated member **110** to move in the first direction W**1** of the second directions of reciprocation (which, in this example, are the swinging directions W).

This makes it possible, with the pair of second cams **132** provided as the second cam on both sides of the rotary drive shaft **120** in the direction of the axis of rotation β**3**, to certainly cause the pair of actuated members **110** to reciprocate in opposite directions **W1** and **W2** of the second directions of reciprocation (which, in this example, are the swinging directions W) when the rotary drive shaft **120** is driven to rotate on the axis of rotation β**3**. This makes it possible to certainly cause the second actuated parts (which, in this example, are the second engagement parts **112**) of the pair of actuated members **110** to operate in opposite directions of the second directions of reciprocation (which, in this example, are the swinging directions W) on both sides of the rotary drive shaft **120** in the direction of the axis of rotation β**3**. In this case, those parts of the pair of actuated members **110** which at least come into contact with the second actuated parts (which, in this example, are the second engagement parts **112**) may be identical or substantially identical in shape to each other, the pair of second cams **132** may be identical or substantially identical in shape to each other, and the displacements of the diameters of the pair of second cams **132** may be identical or substantially identical in phase to each other.

Eleventh Embodiment

The present embodiment may be configured such that the first actuating part (which, in this example, is the first cam **131**) of the plurality of actuating parts (which, in this example, are the first cam **131** and the second cam **132**) performs the roller press action of pressing the second roller (which, in this example, is the pressure roller **172**) against the first roller (which, in this example, is the fixing roller **171**) and the second actuating part (which, in this example, is the second cam **132**) performs a conveyed body deviation correction action (which, in this example, is the belt deviation correction action) of correcting a deviation of the conveyed body (which, in this example, is the fixing belt **173**).

This makes it possible to prevent the first action, which is the roller press action of pressing the second roller (which, in this example, is the pressure roller **172**) against the first roller (which, in this example, is the fixing roller **171**), and the second action, which is the conveyed body deviation correction action (which, in this example, is the belt deviation correction action) of correcting a deviation of the conveyed body (which, in this example, is the fixing belt **173**), from affecting each other. This makes it possible to achieve both the roller press action as the first action and the deviation correction action as the second action simply by controlling the single drive source (which, in this example, is the rotary drive source **190**).

Twelfth Embodiment

In the present embodiment, the conveyed body is an endless belt that is wound around the first roller (which, in this example, is the fixing roller **171**) and the third roller (which, in this example, is the heating roller **174**).

This makes it possible suitably perform both the roller press action and a deviation correction of the endless belt (which, in this example, is the fixing belt **173**).

Detailed Configuration of Drive Mechanism

Next, a detailed configuration of the drive mechanism **100** according to the present embodiment is described below in more concrete terms.

The drive mechanism **100** is configured such that the fixing roller **171** and the pressure roller **172**, which face each other, clamp and convey the fixing belt **173** while rotating each other in a state where the pressure roller **172** is pressed against the fixing roller **171**.

The drive mechanism **100** includes the actuated member **110**, which supports the second roller (which, in this example, is the pressure roller **172**) of the fixing roller **171** and the pressure roller **172** so that the pressure roller **172** is rotatable on an axis with respect to the first roller (which, in this example, is the fixing roller **171**) and the pressure roller **172** is movable in such a first direction **V1** as to move the axes of rotation β**1** and β**2** of the fixing roller **171** and the pressure roller **172** away from each other and in such a second direction **V2** as to move the axes of rotation β**1** and β**2** of the fixing roller **171** and the pressure roller **172** close to each other.

The actuated member **110** is supported to be turnable on the axis of turning β**4**, which is parallel or substantially parallel to the axis of rotation β**2** of the second roller (which, in this example, is the pressure roller **172**), with respect to the first roller (which, in this example, is the fixing roller **171**).

In this example, the actuated member **110** supports the pressure roller **172** so that the pressure roller **172** turns in the first direction **V1** and the second direction **V2** with respect to the fixing roller **171**. The drive mechanism **100** is configured to press the pressure roller **172** against the fixing roller **171** by means of the biasing member **175** via the actuated member **110**, adjust the pressure, and release the pressing of the pressure roller **172** against the fixing roller **171** via the actuated member **110**.

The actuated member **110** rotatably supports the rotating shaft **172*a*** of the pressure roller **172** and is provided to be turnable on the axis of turning β**4** of a turning spindle **113** (specifically, a turning pin) that is parallel or substantially parallel to the rotating shaft **172*a*** of the pressure roller **172**.

The actuated member **110** includes a pair of actuated members **110** (which, in this example, are actuated plates or, specifically, supporting plates) provided along a direction orthogonal or substantially orthogonal to the rotating shaft **172*a*** of the pressure roller **172** on the outside of both ends of the pressure roller **172** in the cross direction X.

The pair of actuated members **110** have recesses **110*c*** on sides thereof that face both rotating shafts **172*a*** of the pressure roller **172**, and rotatably support both rotating shafts **172*a*** of the pressure roller **172** via the bearings **110*d*** in the recesses **110*c***.

The pair of actuated members **110** have long through-holes **110*e*** provided in an area (which, in the example shown in FIG. **4**, is the diagonally downward left side of the pressure roller **172**) surrounding the pressure roller **172** between the axis of rotation β**1** of the fixing roller **171** and the axis of rotation β**2** of the pressure roller **172** and bored along the direction of the axis of turning β**4**.

The long through-holes **110*e*** extend in the swinging directions W or substantially in the swinging directions W. The turning spindle **113** is rotatably supported on the main body (specifically, the main body frame FL) of the fixing device **17**. The long through-holes **110*e*** are locked about the turning spindle **113** to be movable along the swinging directions W. This makes it possible to configure the pair of actuated members **110** to be turnable in the turning directions V and swingable in the swinging directions W.

Note here that the swinging directions W are directions around the axis of swinging β**5** that is orthogonal to or substantially orthogonal to the axis of turning β**4** and, in this example, the axis of swinging β**5** is an axis that is orthogonal to or substantially orthogonal to the axis of turning β**4** and passes through the axis of rotation of β**1** of the fixing roller **171** or the vicinity thereof and the axis of rotation of β**2** of the pressure roller **172** or the vicinity thereof (more specifically, an axis located at a one-side end, the center, or substantially the center [in this example, a rear-side end] of the pressure roller **172** along the axis of rotation of (**32**). This makes it possible to swing the pressure roller **172** in directions of twist with respect to the fixing roller **171**. It should be noted that the swinging directions W may be directions of swinging around an axis of swinging that passes through the axis of rotation of β**2** or the vicinity thereof and is orthogonal to or substantially orthogonal to both the axis of swinging β**5** and the axis of rotation of β**2** (more specifically, an axis located at a one-side end, the center, or substantially the center of the pressure roller **172** along the axis of rotation of (**32**). In this case, the pressure roller **172** swings so as to apply different fixing pressures to the fixing roller **171** on the first side (which, in this example, is the front side) and the second side (which, in this example, is the rear side) of the pressure roller **172** along the axis of rotation of β**2**; however, since the amount of inclination of the pressure roller **172** is very small, the level of deterioration of fixability is acceptable. Further, in either case, considering that the drive transmission mechanism **180** is provided on a one-side end (which, in this example, is a rear-side end) of the fixing roller **171** along the axis of rotation β**1** in order to receive drive from the one-side end of the fixing roller **171** along the axis of rotation β**1**, it is effective for the axis of swinging β**5** to be located on the side end (which, in this example, is the rear-side end) of the pressure roller **172** on which the drive transmission mechanism **180** is provided.

Further, the long through-holes **110***e* further have openings **110***e***1** opening outward (in this example, downward). This makes it possible to simply and easily attach/detach the pair of actuated members **110** to/from the turning spindle **113** and improve the workability of mounting of the pair of actuated members **110** onto the turning spindle **113**.

Specifically, the long through-holes **110***e* have U shapes (which, in this example, are U shapes as seen from the front) whose ends opposite to the pressure roller **172** open. The turning spindle **113** has a shape (which, in this example, is an oval shape) that conforms to the long through-holes **110***e*.

The pair of actuated members **110** (which, in this example, are the main body member **110***a* and the removable member **110***b*) have long through-holes **110***f* provided in positions corresponding to the rotary drive shaft **120** and bored along the direction of the axis of rotation β**3**.

The long through-holes **110***f* extend in the turning directions V or substantially in the turning directions V. Through the long through-holes **110***f*, the rotary drive shaft **120** is inserted. This allows the rotary drive shaft **120** to reciprocate in the turning directions V or substantially in the turning directions V.

Further, the long through-holes **110***f* further have openings **110***f***1** opening outward (in this example, upward). This makes it possible to simply and easily attach/detach the rotary drive shaft **120** to/from the long through-holes **110***f* and improve the workability of mounting of the rotary drive shaft **120** into the long through-holes **110***f*.

Specifically, the long through-holes **110***f* have U shapes (which, in this example, are U shapes as seen from the front) whose ends opposite to the first engagement parts **111** open.

Further, the pair of actuated members **110** have locking parts **110***g* (specifically, mounting bosses) at ends (which, in the example shown in FIG. **4**, the diagonally upward right sides of the pressure roller **172**) thereof opposite to the turning spindle **113** with the pressure roller **172** interposed therebetween. The pair of biasing members **175** have first ends **175***a* locked about the locking parts **110***g* and second ends **175***b* locked about locking parts FLa of the main body (specifically, the main body frames FL) of the fixing device **17**.

The removable member **110***b* provided in a first one (which, in this example, is a front one) of the pair of actuated members **110** is fastened by fastening members SC such as screws to both inner sides of the main body member **110***a*.

First Cam and First Engagement Part

The pair of first cams **131** are provided at both ends of the rotary drive shaft **120** in the direction of the axis of rotation β**3**. The operating state maintenance regions γ**1***a* of the pair of first cams **131** are regions in which the diameters **r1** become constant or substantially constant in a circumferential direction of the pair of first cams **131**. The operating state change regions γ**1***b* of the pair of first cams **131** are regions in which the diameters **r1** become gradually larger or smaller in the circumferential direction of the pair of first cams **131**.

The first engagement parts **111** have contact parts **111***a* that come into contact with the pair of first cams **131**, respectively. In this example, the first engagement parts **111** have circular columnar shapes (which, in this example, are circular shapes as seen from the front). The first engagement parts **111** come into contact with the pair of first cams **131** at the contact parts **111***a* on the outer circumferential surfaces of the circular columnar shapes.

Specifically, the pair of first cams **131** are separate from the rotary drive shaft **120** and is fastened to the rotary drive shaft **120**. The first engagement parts **111** have outer rings **111***b* constituting ball bearings that rotate on an axis of rotation β**6** that is parallel or substantially parallel to the rotation of axis β**3** of the rotary drive shaft **120**.

The first engagement parts **111** are provided in such positions in the main body members **110***a* of the pair of actuated members **110** that the pressure roller **172** is brought into a pressed state against the fixing roller **171** in positions in the operating state maintenance regions γ**1***a* of the pair of first cams **131** where the first engagement parts **111** are actuated, respectively. Note here that the pressed state is a state of reference fixing pressure serving as a reference (which, in this example, is a state of maximum rated pressure at which a normal sheet such as normal paper is fixed). In addition, the first engagement parts **111** are provided in such positions in the main body members **110***a* of the pair of actuated members **110** that the pressure roller **172** is brought into a pressure adjustment state and/or a pressure release state against the fixing roller **171** in positions in the operating state change regions γ**1***b* of the pair of first cams **131** where the first engagement parts **111** are actuated, respectively. Note here that the pressure adjustment state is a state of low fixing pressure adjusted to be lower than the reference fixing pressure (which, in this example, is a state of minimum rated pressure at which a thick sheet such as an envelope or thick paper is fixed) and the pressure release state is a state where no pressure is being applied from the pressure roller **172** toward the fixing roller **171** by the biasing members **175**.

It should be noted that, from the point of view of avoiding inconveniences such as deformation or the like of the fixing roller **171** and/or the pressure roller **172**, the drive mechanism **100** is in the pressure release state at the time of factory shipment or when no image is being formed.

The first cams **131** are configured to make the fixing pressure of the pressure roller **172** against the fixing roller **171** the reference fixing pressure in the positions in the operating state maintenance regions γ**1***a* where the first engagement parts **111** are actuated.

Specifically, the first cams **131** are configured such that, in the positions in the operating state maintenance regions γ**1***a* of the pair of first cams **131** where the first engagement parts **111** are actuated, the distance d between the contact parts **111***a* of the first engagement parts **111** with the pair of first cams **131** and the axis of rotation **03** of the rotary drive shaft **120** is maintained at a predetermined first constant distance (e.g. a minimum distance) even when the pair of first cams **131** are rotated in a first direction R**1** and a second direction R**2** of directions of rotation R. This makes it possible to maintain the pressed state of the pressure roller **172** against the fixing roller **171**.

Further, the first cams **131** are configured to adjust the fixing pressure of the pressure roller **172** against the fixing roller **171** in the positions in the operating state maintenance regions γ**1***a* where the first engagement parts **111** are actuated.

Specifically, the first cams **131** are configured such that the distance d between the contact parts **111***a* of the first engagement parts **111** with the pair of first cams **131** and the axis of rotation β**3** of the rotary drive shaft **120** is made a variable distance (e.g. a distance that is longer than the minimum distance and shorter than a maximum distance) by rotating the pair of first cams **131** in the first direction R**1** of the directions of rotation R from the positions in the operating state maintenance regions γ**1***a* of the pair of first cams **131** where the first engagement parts **111** are actuated toward the positions in the operating state change regions γ**1***b* where the first engagement parts **111** are actuated. This makes it possible to bring the pressure roller **172** into the pressure adjustment state against the fixing roller **171**.

Further, the first cams **131** are configured to release the fixing pressure of the pressure roller **172** against the fixing roller **171** in the positions in the operating state change regions γ**1***b* where the first engagement parts **111** are actuated.

Specifically, the first cams **131** are configured such that the distance d between the contact parts **111***a* of the first engagement parts **111** with the pair of first cams **131** and the axis of rotation β**3** of the rotary drive shaft **120** is made a predetermined second constant distance (e.g. the maximum distance) that is longer than the first constant distance by rotating the pair of first cams **131** in the first direction R**1** of the directions of rotation R from the positions in the operating state maintenance regions γ**1***a* of the pair of first cams **131** where the first engagement parts **111** are actuated toward the positions in the operating state change regions γ**1***b* where the first engagement parts **111** are actuated. This makes it possible to bring the pressure roller **172** into the pressure release state against the fixing roller **171**.

In this example, the first cams **131** are configured to adjust the fixing pressure of the pressure roller **172** against the fixing roller to a stepless set pressure. Note, however, that the first cams **131** is not limited to this configuration but may be configured to adjust the fixing pressure of the pressure roller **172** against the fixing roller **171** to one or more steps of set pressure.

Second Cam and Second Engagement Part

The second cam **132** is provided at one end (which, in this example, is a front end) of the rotary drive shaft **120** in the direction of the axis of rotation β**3**. The operating state change region γ**2***b* of the second cam **132** is a region in which the diameter (radius r**2**) becomes gradually larger or smaller in a circumferential direction of the second cam **132**. The operating state maintenance region γ**2***a* of the second cam **132** is a region in which the diameter (radius r**2**) becomes constant or substantially constant in the circumferential direction of the second cam **132**.

The second engagement part **112** has contact parts **112***a* that come into contact with the second cam **132**. In this example, the second engagement part **112** has a curved part **112***b* (specifically, a U-shaped groove as seen from the front) that is curved substantially half around along the circumferential direction of the second cam **132**. The second engagement part **112** comes into contact with the second cam **132** at the contact parts **112***a* on the inner circumferential surface of the curved part **112***b*. The size of the second engagement part **112** between the opposed contact parts **112***a* is a size that is slightly larger than the diameter of the second cam **132** (i.e. such a size that the second cam **132** can be smoothly inserted through the second engagement part **112**).

The contact parts **112***a* have extended parts **112***a***1** extended along the turning directions V or substantially along the turning directions V. This allows the second engagement part **112** to certainly bring the second cam **132** into contact at the contact parts **112***a*.

Further, the second engagement part **112** further has an opening **112***c* whose end opposite to the bottom of the curved part **112***b* opens. This makes it possible to simply and easily attach/detach the second cam **132** to/from the actuated member **110**.

Specifically, the second cam **132** is eccentric by a diameter that is smaller than the diameter of the rotary drive shaft **120**. The second cam **132** is formed integrally with the rotary drive shaft **120** by performing a predetermined process (specifically, a cutting process) on the rotary drive shaft **120**.

The second engagement part **112** is provided in such a position in the removable member **110***b* in the first one (which, in this example, is the front one) of the pair of actuated members **110** that the pressure roller **172** is brought into an inclined state (where the first side [which, in this example, is the front side] of the pressure roller **172** moves [or, in this example, becomes higher or lower] in the first direction W**1** or the second direction W**2** of the swinging directions W) or a parallel state with respect to the fixing roller **171** in a position in the operating state change region γ**2***b* of the second cam **132** where the second engagement part **112** is actuated.

It should be noted that examples of the amount of inclination of the pressure roller **172** with respect to the fixing roller **171** includes, but are not limited to, approximately ±0.5 mm (approximately ±0.09 degree in term of the angle of inclination) in an A4 portrait size configuration (specifically, approximately 300 mm).

In the position in the operating state change region γ**2***b* of the second cam **132** where the second engagement part **112** is actuated, rotating the second cam **132** in the first direction R**1** of the directions of rotation R allows the second engagement part **112** to move in the first direction W**1** of the swinging directions W. This makes it possible to incline the pressure roller **172** with respect to the fixing roller **171** so that the first side (which, in this example, is the front side) of the pressure roller **172** moves (or, in this example, becomes higher) in the first direction W**1** of the swinging directions W. Further, in the position in the operating state change region γ**2***b* of the second cam **132** where the second engagement part **112** is actuated, rotating the second cam **132** in the second direction R**2** of the directions of rotation R allows the second engagement part **112** to move in the second direction W**2** of the swinging directions W. This makes it possible to incline the pressure roller **172** with respect to the fixing roller **171** so that the first side (which, in this example, is the front side) of the pressure roller **172** moves (or, in this example, becomes lower) in the second direction W**2** of the swinging directions W. Furthermore, in the position in the operating state change region γ**2***b* of the second cam **132** where the second engagement part **112** is actuated, returning the second cam **132** from the first direction R**1** or the second direction R**2** of the directions of rotation R allows the second engagement part **112** to return from the first direction W**1** or the second direction W**2** of the swinging directions W. This makes it possible to make the pressure roller **172** parallel or substantially parallel to the fixing roller **171**.

Incidentally, when the fixing pressure between the fixing roller **171** and the pressure roller **172** is equal to or higher than a predetermined pressure or is higher than the predetermined pressure, the fixing belt **173** is easily damaged if the fixing belt **173** deviates to the first side (front side) or the second side (rear side) and makes contact with various members (e.g. the fixing roller **171** and flanges **174***d* of the heating roller **174**) that are adjacent to the fixing belt **173**. On the other hand, when the fixing pressure between the fixing roller **171** and the pressure roller **172** is lower than the predetermined pressure or is equal to or lower than the predetermined pressure, damage to the fixing belt **173** can be avoided even if the fixing belt **173** deviates to the first side (front side) or the second side (rear side) and makes contact with various members (e.g. the fixing roller **171** and the flanges **174***d* of the heating roller **174**) that are adjacent to the fixing belt **173**.

In this respect, in the present embodiment, when the pair of first cams **131** bring the pressure roller **172** into the pressure adjustment state and/or the pressure release state against the fixing roller **171** in the positions in the operating state change regions γ**1***b* where the first engagement parts **111** are actuated, the second cam **132** does not perform the belt deviation correction action on the second engagement part **112**.

Specifically, the pair of first cams **131** retract the second cam **132** from the second engagement part **112** in the positions in the operating state change regions γ**1***b* where the first engagement parts **111** are actuated. In this example, a first (in this example, front) actuated member **110** (which, in this example, is the removable member **110***b*) of the pair of actuated members **110** is provided with, in addition to the second engagement part **112**, rotary drive shaft retraction parts **114** lined up at both ends of the second engagement part **112** in the directions of rotation R. In the positions in the operating state change regions γ**1***b* where the first engagement parts **111** are actuated, the pair of first cams **131** retract, into the rotary drive shaft retraction parts **114**, the second cam **132** and a part of the rotary drive shaft **120** that is adjacent to the second cam **132** or at least the part of the rotary drive shaft **120** that is adjacent to the second cam **132** (in this example, both the second cam **132** and the part of the rotary drive shaft **120** that is adjacent to the second cam **132**).

In this example, the rotary drive shaft retraction parts **114** are configured to make the pressure roller **172** parallel or substantially parallel to the fixing roller **171**. Specifically, the rotary drive shaft retraction parts **114** are configured to be insertion parts through which, in a position where they make the pressure roller **172** parallel or substantially parallel to the fixing roller **171**, the rotary drive shaft **120** is inserted to be able to reciprocate in the turning directions V. The rotary drive shaft retraction parts **114** are provided in the actuated member **110** (which, in this example, is the removable member **110***b*) so that the rotary drive shaft **120** reciprocates in the turning directions V in the positions in the operating state change regions γ**1***b* of the first cams **131** where the first engagement parts **111** are actuated. The size between the rotary drive shaft retraction parts **114** is a size that is slightly larger than the diameter of the rotary drive shaft **120** (i.e. such a size that the rotary drive shaft **120** can be smoothly inserted through the rotary drive shaft retraction parts **114**). This makes it possible to set up a configuration so that when an operating state of the first engagement parts **111** is changed in the positions in the operating state change regions γ**1***b* of the first cams **131** where the first engagement parts **111** are actuated, the action on the second engagement part **112** by the second cam **132** is not performed, and also makes it possible to insert the rotary drive shaft **120** through the rotary drive shaft retraction parts **114** to make the pressure roller **172** parallel or substantially parallel to the fixing roller **171**.

Even with such a configuration in which when the operating state of the first engagement parts **111** is changed in the positions in the operating state change regions γ**1***b* of the first cams **131** where the first engagement parts **111** are actuated (specifically, when the pressure roller **172** is in the pressure adjustment state against the fixing roller **171**), the action (specifically, the belt deviation correction action) on the second engagement part **112** by the second cam **132** is not performed, damage to the fixing belt **173** can be avoided even if, when the fixing pressure between the fixing roller **171** and the pressure roller **172** is lower than the predetermined pressure or is equal to or lower than the predetermined pressure, the fixing belt **173** deviates and makes contact with various members (e.g. the fixing roller **171** and the flanges **174***d* of the heating roller **174**) that are adjacent to the fixing belt **173**.

Further, when the operating state of the first engagement parts **111** is changed in the positions in the operating state change regions γ**1***b* of the first cams **131** where the first engagement parts **111** are actuated (specifically, when the pressure roller **172** is in the pressure adjustment state against the fixing roller **171**), the pressure roller **172** can be made parallel or substantially parallel to the fixing roller **171**. This makes it possible to minimize the occurrence of a deviation of the fixing belt **173**.

Further, in this example, guide parts **115** that guide the second cam **132** located in the rotary drive shaft retraction parts **114** toward the contact parts **112***a* are provided between the rotary drive shaft retraction parts **114** and the contact parts **112***a*. Specifically, the guide parts **115** are formed so that the size between the opposed guide parts **115** becomes gradually smaller from the rotary drive shaft retraction parts **114** toward the contact parts **112***a*.

Drive Transmission Mechanism

In the present embodiment, the fixing device **17** further includes the drive transmission mechanism **180**, which acts as drive transmission means for transmitting rotary drive force to the rotary drive shaft **120**, and the rotary drive source **190**, which acts as drive means for driving the rotary drive shaft **120** via the drive transmission mechanism **180** to rotate.

The drive transmission mechanism **180** is configured to transmit rotary drive force in a first direction of rotation A**1** and rotary drive force in a second direction of rotation A**2** from the rotary drive source **190** to the rotary drive shaft **120**.

Specifically, the drive transmission mechanism **180** is a gear train including a plurality of gears. More specifically, the drive transmission mechanism **180** includes a first gear **181** that is coupled to a rotating shaft **191** of the rotary drive source **190**, a second gear **182** that is coupled to the rotary drive shaft **120**, and a relay gear group **180***a* that transmits rotary drive force from the first gear **181** to the second gear **182**.

The relay gear group **180***a* includes a plurality of (in this example, three) combined gears (which, in this example, are a first combined gear **183**, a second combined gear **184**, and a third combined gear **185**) obtained by coaxially combining gears that are different in outer diameter (number of teeth) from each other. The first combined gear **183** is configured such that its large-diameter gear intermeshes with the first gear **181** and its small-diameter gear intermeshes with a large-diameter gear of the second combined gear **184**. The second combined gear **184** is configured such that its large-diameter gear intermeshes with the small-diameter gear of the first combined gear **183** and its small-diameter gear intermeshes with a large-diameter gear of the third combined gear **185**. The third combined gear **185** is configured such that its large-diameter gear intermeshes with the small-diameter gear of the second combined gear **184** and its small-diameter gear intermeshes with the second gear **182**.

The first combined gear **183**, the second combined gear **184**, and the third combined gear **185** have their respective rotating shafts **183***a*, **184***a*, and **185***a* rotatably fixed and supported on the image forming apparatus main body **210** (specifically, a main body frame [not illustrated]).

Control Section

As shown in FIG. **17**, the image forming apparatus **200** further includes a control section **220** that exercises overall control over the image forming apparatus **200**. It should be noted that the control section **220** may be included in the fixing device **17** or the drive mechanism **100**.

The control section **220** includes a processing section **221** composed of a microcomputer such as a CPU and a storage section **222** including a nonvolatile memory such as a ROM and a volatile memory such as a RAM. The processing section **221** loads, onto the RAM of the storage section **222**, a control program stored in advance in the ROM of the storage section **222** and executes the control program, whereby the control section **220** controls the actuation of the various constituent elements. The RAM of the storage section **222** provides the processing section **221** with regions serving as image memories in which to store a work area and image data, respectively.

Roller Press Sensing

The second gear **182** has a sensed part **182***a* in a part of the outer edge thereof (see FIG. **4**). The sensed part **182***a* is sensed by a rotational position sensing section **186** that senses the rotational position of the rotary drive shaft **120**.

In this example, the sensed part **182***a* is a protrusion that protrudes outward in the cross direction X. In this example, the rotational position sensing section **186** includes a movable component **186***a* that is turned on when pressed by external force and is turned off when not pressed by external force. The rotational position sensing section **186** is a sensor that is turned on when the movable component **186***a* is pressed by the sensed part **182***a* and that is turned off when the movable component **186***a* is released from being pressed by the sensed part **182***a*.

The rotational position sensing section **186** is electrically connected to an input system of the control section **220**. This allows the control section **220** to recognize the home position (origin position) of the rotary drive shaft **120** by receiving an on signal from the rotational position sensing section **186** during the pressing of the movable component **186***a* by the sensed part **182***a*.

The rotary drive source **190** (which, in this example, is a stepping motor) is fixedly provided in the image forming apparatus main body **210** (specifically, the main body frame [not illustrated]) so that the rotating shaft **191** faces in the direction of the axis of rotation β**3**. The rotary drive source **190** is electrically connected to an output system of the control section **220**.

Roller Press Action

The control section **220** is configured to control the start and stoppage of rotation of the pair of first cams **131** by outputting, to the rotary drive source **190**, an actuating signal (specifically, a pulse signal) representing the rotational position (rotation angle) of the rotary drive shaft **120** with reference to the home position (origin position) of the rotary drive shaft **120** as obtained by the rotational position sensing section **186**. This allows the control section **220** to, by rotating the pair of first cams **131** via the drive transmission mechanism **180** and the rotary drive shaft **120** by means of the rotary drive source **190**, press the pressure roller **172** against the fixing roller **171**, adjust the pressure of the pressure roller **172** against the fixing roller **171**, and release the pressure roller **172** from being pressed against the fixing roller **171**.

Belt Deviation Sensing

The fixing device **17** may include a belt position sensing section **187** that senses the position of the fixing belt **173** in the direction of the axis of rotation β**1**. The control section **220** may correct a deviation of the fixing belt **173** by swinging the pressure roller **172** in accordance with a result of sensing yielded by the belt position sensing section **187**. This makes it possible to certainly correct a deviation of the fixing belt **173**.

Specifically, the belt position sensing section **187** is provided lateral to the first side (which, in this example, is the front side) of the fixing belt **173** in the cross direction X. The belt position sensing section **187** senses a deviation of the fixing belt **173** in the direction of the axis of rotation β**1** of the fixing belt **173**.

In this example, the belt position sensing section **187** includes a transmissive light sensor **187***a* and a movable component **187***b* (specifically, an actuator) (see FIG. **8**).

The transmissive light sensor **187***a* includes a light-emitting part **187***a***1** that emits light and a light-receiving part **187***a***2** that receives the light from the light-emitting part **187***a***1**.

The movable component **187***b* is supported on a turning shaft **187***c* to be turnable in turning directions Q around an axis of the turning shaft **187***c* between a light-transmitting position and a light-blocking position. The movable component **187***b* includes a main body part **187***b***1** turnably provided on the turning shaft **187***c*, a sensed part **187***b***2** provided on the main body part **187***b***1**, and a contact part **187***b***3** provided on the main body part **187***b***1** at a different angle in a circumferential direction from the sensed part **187***b***2**.

The main body part **187***b***1** is a circular cylindrical member whose axial movement is regulated by a pair of regulating members **187***c***1** provided on the turning shaft **187***c*.

The sensed part **187***b***2** turns in a first direction Q**1** or a second direction Q**2** of the turning directions Q to take the light-blocking position, in which to block the light from the light-emitting part **187***a***1** to the light-receiving part **187***a***2** in the transmissive light sensor **187***a*, and the light-transmitting position, in which to transmit the light from the light-emitting part **187***a***1** to the light-receiving part **187***a***2**.

The contact part **187*b*3** comes into contact with a first end (which, in this example, is a front end) of the fixing belt **173** in the cross direction X.

The movable component **187*b*** is biased by a biasing member **187*d*** (specifically, a coiled spring) in such a direction (which, in this example, is the first direction Q1 of the turning direction Q) that the contact part **187*b*3** comes into contact with the fixing belt **173**.

Moreover, the movable component **187*b*** is configured such that the sensed part **187*b*2** is located in the light-blocking position when the fixing belt **173** is in a reference position of the fixing roller **171** in the direction of axis of rotation β**1** (e.g. the middle position of the fixing roller **171** in the direction of axis of rotation β**1**) and the fixing belt **187*b*2** is located in the light-transmitting position in the first direction Q**1** or the second direction Q**2** of the turning directions Q when the fixing belt **173** deviates to the first side (which, in this example, is the front side) or the second side (which, in this example, is the rear side) of the fixing roller **171** in the direction of axis of rotation β**1**.

The belt position sensing section **187** (specifically, the transmissive light sensor **187*a***) is electrically connected to the input system of the control section **220**. This allows the control section **220** to recognize the presence or absence of a deviation of the fixing belt **173** by receiving an off signal or an on signal from the belt position sensing section **187** through the light-receiving part **187*a*2** with the sensed part **187*b*2** in the light-blocking position or the light-transmitting position.

Belt Deviation Correction Action

The control section **220** is configured to, in the positions in the operating state maintenance regions γ**1*a*** of the pair of first cams **131** where the first engagement parts **111** are actuated, control the start and stoppage of rotation of the second cam **132** by outputting, to the rotary drive source **190**, an actuating signal (specifically, a pulse signal) representing the rotational position (rotation angle) of the rotary drive shaft **120** with reference to the presence or absence of a deviation of the fixing belt **173** as obtained by the belt position sensing section **187**.

Specifically, when having detected a deviation of the fixing belt **173** by means of the belt position sensing section **187**, the control section **220** first moves the second engagement part **112** in the first direction W**1** of the swinging directions W by rotating the second cam **132** in the first direction R**1** of the directions of rotation R in the positions in the operating state maintenance regions γ**1*a*** of the pair of first cams **131** where the first engagement parts **111** are actuated, and then inclines the pressure roller **172** with respect to the fixing roller **171** so that the first side (which, in this example, is the front side) of the pressure roller **172** moves (or, in this example, becomes higher) in the first direction W**1** of the swinging directions W.

Next, when not detecting the returning of the fixing belt **173** to the reference position by means of the belt position sensing section **187** even when a predetermined period of time passes, the control section **220** moves the second engagement part **112** in the second direction W**2** of the swinging directions W by rotating the second cam **132** in the second direction R**2** of the directions of rotation R in the positions in the operating state maintenance regions γ**1*a*** of the pair of first cams **131** where the first engagement parts **111** are actuated, and then inclines the pressure roller **172** with respect to the fixing roller **171** so that the first side (which, in this example, is the front side) of the pressure roller **172** moves (or, in this example, becomes lower) in the second direction W**2** of the swinging directions W.

Moreover, upon detecting the returning of the fixing belt **173** to the reference position by means of the belt position sensing section **187**, the control section **220** stops the rotation of the second cam **132** in the positions in the operating state maintenance regions γ**1*a*** of the pair of first cams **131** where the first engagement parts **111** are actuated.

This allows the control section **220** to correct a deviation of the fixing belt **173** by rotating the second cam **132** via the drive transmission mechanism **180** and the rotary shaft **120** by means of the rotary drive source **190** in the positions in the operating state maintenance regions γ**1*a*** of the pair of first cams **131** where the first engagement parts **111** are actuated.

Further, the control section **220** is configured not to control the belt deviation correction action on the second cam **132** in the positions in the operating state maintenance regions γ**1*a*** of the pair of first cams **131** where the first engagement parts **111** are actuated (specifically, the positions where the pressure roller **172** is brought into the pressure adjustment state and/or the pressure release state against the fixing roller **171**).

It should be noted that the belt position sensing section **187** may be configured to sense a direction of deviation of the fixing belt **173** and the control section **220** may be configured to recognize the direction of deviation of the fixing belt **173** and perform the belt deviation correction action.

Other Embodiments

It should be noted that although, in the present embodiment, the belt deviation correction device **300** is applied to the fixing device **17**, which conforms to a belt method, it may be applied to a conveying device that conforms a belt method (e.g. the primary transfer belt device **6**, the secondary belt device **10**, or the like).

Further, although, in the present embodiment, the plurality of actuated parts and the plurality of actuating parts are two actuated parts and two actuating parts, they may be three or more actuated parts and three or more actuating parts.

Further, although, in the present embodiment, the conveyed body is an endless belt and a deviation of the endless belt is corrected, the conveyed body may be a sheet and a deviation of the sheet may be corrected.

The present disclosure is not limited to the embodiments described above but may be carried out in other various forms. Therefore, the embodiments are mere examples in every way and should not be interpreted in a limited way. The scope of the present disclosure is indicated by the scope of the claims and is not bound by the main body of the specification in any way. Furthermore, all modifications and alternations that pertain to the scope of equivalents of the scope of the claims fall within the scope of the present disclosure.

The present disclosure contains subject matter related to that disclosed in Japanese Priority Patent Application JP 2017-80828 filed in the Japan Patent Office on Apr. 14, 2017, the entire contents of which are hereby incorporated by reference.

What is claimed is:

1. A belt deviation correction device for correcting a deviation of an endless belt wound around a plurality of rollers, comprising:

a pressing roller that is pressed from outside the endless belt wound around the plurality of rollers; and a drive mechanism that drives a plurality of actuated parts that are different from each other in order to swing the pressing roller, wherein

the pressing roller is configured to swing in such a way as to be inclined with respect to the plurality of rollers,

a deviation of the endless belt in a direction of an axis of rotation of the plurality of rollers is corrected by swinging the pressing roller, and

the drive mechanism includes:

a single drive part to which a drive force is transmitted from a single drive source, and

a plurality of actuating parts provided on the single drive part so that in actuating a first actuated part and a second actuated part of the plurality of actuated parts separately with the drive force from the single drive part, a first action on the first actuated part and a second action on the second actuated part do not affect each other.

2. The belt deviation correction device according to claim **1**, further comprising a belt position sensing section that senses a position of the endless belt in the direction of the axis of rotation of the plurality of rollers,

wherein the deviation of the endless belt is corrected by swinging the pressing roller in accordance with a result of sensing yielded by the belt position sensing section.

3. The belt deviation correction device according to claim **1**, wherein a first actuating part of the plurality of actuating parts has an operating state maintenance region in which to maintain an operating state of the corresponding first actuated part,

a second actuating part of the plurality of actuating parts has an operating state change region in which to change an operating state of the corresponding second actuated part, and

when an operating state of the first action on the first actuated part is maintained in the operating state maintenance region of the first actuating part, an operating state of the second action on the second actuated part is changed in the operating state change region of the second actuating part.

4. The belt deviation correction device according to claim **1**, wherein a first actuating part of the plurality of actuating parts has an operating state change region in which to change an operating state of the corresponding first actuated part, and

when an operating state of the first action on the first actuated part is changed in the operating state change region of the first actuating part, the second action on the second actuated part by the second actuating part is not performed.

5. The belt deviation correction device according to claim **1**, wherein the single drive source is a rotary drive source that outputs rotary drive force,

the single drive part is a rotary drive shaft to which the rotary drive force from the rotary drive source is transmitted,

at least two actuating parts of the plurality of actuating parts are constituted by cams,

a first cam and a second cam of the cams are provided on the rotary drive shaft so that the first action in which the first cam actuates the first actuated part and the second action in which the second cam actuates the second actuated part do not affect each other.

6. The belt deviation correction device according to claim **5**, wherein the first cam and the second cam are provided on the rotary drive shaft so that a displacement of a diameter of the first cam and a displacement of a diameter of the second cam are not in phase with each other.

7. The belt deviation correction device according to claim **5**, wherein the drive mechanism further includes an actuated member in which the first actuated part and the second actuated part are provided,

the first cam causes the actuated member to reciprocate in first directions of reciprocation by means of the first actuated part, and

the second cam causes the actuated member to reciprocate in second directions of reciprocation that are different from the first directions of reciprocation by means of the second actuated part.

8. The belt deviation correction device according to claim **7**, wherein the first directions of reciprocation include turning directions of turning around an axis of turning that is parallel or substantially parallel to a direction of an axis of rotation of the rotary drive shaft,

the second directions of reciprocation include swinging directions of swinging around an axis of swinging that intersects the axis of turning, and

the actuated member is configured to be turnable in the turning directions and swingable in the swinging directions.

9. The belt deviation correction device according to claim **7**, wherein the actuated member includes a main body member in which the first actuated part is provided and a removable member, removably provided in the main body member, in which the second actuated part is provided.

10. The belt deviation correction device according to claim **7**, wherein the actuated member includes a pair of actuated members located on both sides of the rotary drive shaft in a direction of an axis of rotation of the rotary drive shaft, and

the first cam includes a pair of first cams provided on both sides of the rotary drive shaft in the direction of the axis of rotation and is configured to cause the pair of actuated members to reciprocate in the same direction of the first directions of reciprocation when the rotary drive shaft is driven to rotate on the axis of rotation.

11. The belt deviation correction device according to claim **7**, wherein the actuated member includes a pair of actuated members located on both sides of the rotary drive shaft in a direction of an axis of rotation of the rotary drive shaft, and

the second cam is a single second cam provided on one side of the rotary drive shaft in the direction of the axis of rotation and is configured to cause that one of the pair of actuated members on which the single second cam is provided to reciprocate in the second directions of reciprocation.

12. The belt deviation correction device according to claim **7**, wherein the actuated member includes a pair of actuated members located on both sides of the rotary drive shaft in a direction of an axis of rotation of the rotary drive shaft, and

the second cam includes a pair of second cams provided on both sides of the rotary drive shaft in the direction of the axis of rotation and is configured to cause the pair of actuated members to reciprocate in opposite directions of the second directions of reciprocation when the rotary drive shaft is driven to rotate on the axis of rotation.

13. The belt deviation correction device according to claim **1**, wherein a first actuating part of the plurality of actuating parts performs a roller press action of pressing the pressing roller against any one of the plurality of rollers, and a second actuating part of the plurality of actuating parts performs a belt deviation correction action of correcting a deviation of the endless belt.

14. A fixing device comprising the belt deviation correction device according to claim **1**,

wherein the plurality of rollers include a fixing roller and a heating roller,

the pressing roller is a pressure roller, and

the endless belt is a fixing belt.

15. An image forming apparatus comprising:

the fixing device according to claim **14**.

16. An image forming apparatus comprising:

the belt deviation correction device according to claim **1**.

17. A belt deviation correction method for correcting a deviation of an endless belt wound around a plurality of rollers, comprising:

correcting a deviation of the endless belt in a direction of an axis of rotation of the plurality of rollers by swinging a pressing roller so that the pressing roller is inclined with respect to the plurality of rollers, the pressing roller being pressed from outside the endless belt wound around the plurality of rollers, wherein

the belt deviation correction method causes the pressing roller to swing by driving a plurality of actuated parts that are different from each other,

the belt deviation correction method includes using a single drive part to which a drive force is transmitted from a single drive source, and a plurality of actuating parts provided on the single drive part, and

in response to the single drive part actuating a first actuated part and a second actuated part of the plurality of actuated parts separately with the drive force from the single drive part, a first action on the first actuated part and a second action on the second actuated part do not affect each other.

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